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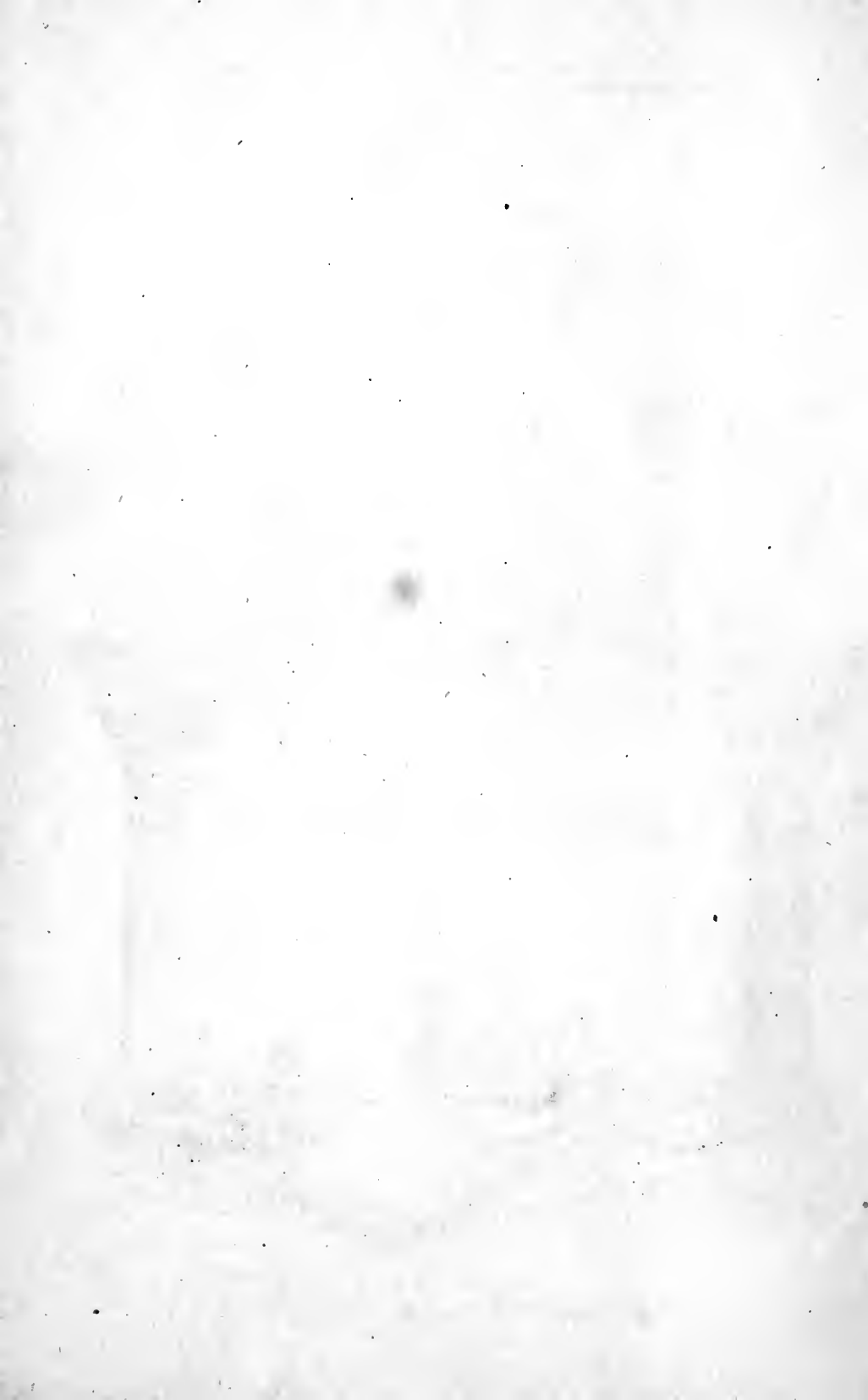
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THE
FAMILY TUTOR

VOL 3

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THE HISTORY OF THE

OF THE

LONDON:
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PREFACE TO THE THIRD VOLUME.

WE have completed our Third Volume, and fulfilled some of the promises made in our Preface to the Second. GEOLOGY is completed, CLASS AND PROFESSIONAL TRAINING is advancing, the TALES of HISTORY and of TRAVEL are still being continued, and many useful Miscellaneous Matters have been introduced as opportunity occurred.

The chief feature which marks the present volume, and which was not included in the previous announcements, is the introduction of "THE MIRROR OF NATURE," a translation of an excellent work, which we have already highly commended. This will be continued and concluded in our Fourth Volume. Another feature is the "FAMILIAR CONVERSATIONS," adapted for our more juvenile readers. These Conversations will also be continued. After some experience it was deemed proper to omit the "REVIEWS OF BOOKS," because they were found to displace matter of more permanent value.

The TUTOR is of opinion that it is better to have ONE subject ably and fully treated in a Volume, than to introduce abridged treatises upon many subjects, to the detriment of all.

ASTRONOMY

has been selected as the subject to follow the

GRAMMAR, GEOGRAPHY, AND GEOLOGY

of our first three volumes. The new subject will be familiarly treated, in the style of epistolary correspondence, and will be accompanied by many BEAUTIFUL ILLUSTRATIONS.

Whatever has been omitted, or may be necessary, will be kept in view, and will be introduced as soon as any vacancy occurs in the TUTOR's pages.

Lest any misconception may arise from our intimate alliance with THE FAMILY FRIEND, and the change in the time of publication of that periodical, we must announce that, although the FRIEND becomes a WEEKLY Publication, the TUTOR will

continue to be published FORTNIGHTLY, as hitherto. Some of our pupils will, we know, be a little jealous of the start which the FRIEND thus takes, and will apply, as an argument for the more frequent issue of the TUTOR, the views urged on behalf of the FRIEND's weekly appearance, in the Preface to the Sixth Volume.

The TUTOR, however, is a book to be closely STUDIED. And, viewed in this light, there is less requirement for its more frequent issue. Moreover, if we resolved upon a New Series, this would be an unfavourable stage at which to announce it—for the first Series would then only consist of THREE VOLUMES, and the arrangement of the subjects comprised therein would be incomplete. The TUTOR, therefore, hopes that his Pupils will consent to the present arrangements, at least until the close of the year, when the first Series of the TUTOR may be resolved into a complete

GRAMMAR, GEOGRAPHY, GEOLOGY, AND ASTRONOMY.

At that period, any desire that may be expressed by an important number of our pupils, will be cheerfully and respectfully considered.

The TUTOR, delighting in the discharge of duties rendered the more pleasing to him by the acceptance that they find, is happy to pay tribute to the intelligence and perseverance of many who look for instruction to the pages which he superintends. For the encouragement of these hopeful and promising students, he quotes the sentiments of HORACE MANN:—

“The world is entering upon a new moral cycle. The great heart of humanity is heaving with hopes of a brighter day. All the higher instincts of our nature prophecy its approach; and the best intellects of the race are struggling to turn that prophecy to fulfilment. Thoughts of freedom, duty, benevolence, and human brotherhood, agitate the nations. Glowing with a vivid conception of these truths, so wonderful and so indisputable, let me ask, whether, among all the spectacles which earth presents, and which angels might look down upon with an ecstasy too deep for utterance, is there one fairer and more enrapturing to the sight than that of a young man, just fresh from the Creator's hands, and with the unspent energies of the coming eternity wrapped up in his bosom, surveying and recounting, in the solitude of his closet, the mighty gifts with which he has been endowed, and the magnificent career of usefulness and of blessedness which has been opened before him; and determining, with one all-concentrating, and all-hallowing resolution, *that he will live, true to the noblest capacities of his being, and in obedience to the highest law of his nature!*”

LONDON, June 11, 1852.

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POPULAR GEOLOGY.

I.—INTRODUCTORY CHAPTER.—THE MATERIAL ORIGIN OF THE GLOBE.

1. *The name* Geology is derived from two Greek words, *ge*, signifying the earth; and *logos*, a discourse; and which, together, may be translated as reasoning about the structure of the earth, or simply the science of the earth.

2. *The objects* of Geology are to produce a true history of the origin and structure of the globe; of the changes which it has undergone; of the various tribes of plants and animals which have at different periods occupied its surface; and, lastly, to reason from the known state of things in the past, to the probable state of things in the future.

3. *Cosmogony, necessarily a part of Geology.*—As to the origin of the earth, many Geologists appear to think that, as the utmost efforts of man's mind can only enable him to speculate upon this vast mystery, it should be altogether dismissed from the region of Geological science. Hatton says, Geology is in no wise concerned with questions as to the origin of things; and Lyell, that Geology differs as widely from Cosmogony,* as speculations concerning the mode of the first creation of man differ from history. Now these gentlemen would be the last to say, that between the material mode of originating the world, and its existing structure, there is an impassable barrier; or, in other words, that there is no *cause* in the first bearing a distinct relation to *effects* in the second. They both believe just the contrary. Geology, therefore, has, we think, rightly concerned itself with the origin of the globe, and must continue to do so. But let us not be mistaken. Crude speculations on such a theme are worse than useless; they are, so to speak, irreverent. Men should come to such a subject with something of the spirit that imbued those who were privileged to enter the holy of holies in the ancient Jewish temples. The high-priests of knowledge alone should walk here.

4. *Laplace's Theory.*—The philosopher whose speculations on the origin of the world have stood without injury the test of time, and an unceasing comparison with all the known phenomena of the solar system, is the French astronomer and mathematician, Laplace. The following theory is founded upon his views. Vast extensions of luminous and heated matter exist in space. In one of these a nucleus is established, and becomes a centre of aggregation to the neighbouring particles. As they flow on in varying directions, opposing currents are formed, which meet, and cause a rotatory motion to take place; just as we may see, in the waters of a running stream, little bubbles appear, go round and round, strike against each other, then mingle perhaps into one, and still continue to rotate. As the nucleus—or Sun—for it is that of which we speak—increases in size, so it increases in rapidity; and should condensation take place through the loss of heat, arising from a difference of temperature between the heated nebulous matter and the colder surrounding space, that would also accelerate speed. At last the centrifugal, or flying-off force, overcomes the agglomerating or centripetal force, and mass after mass is thrown off in the form of rings or zones. If these happen to be of uniform constitution, they preserve their shape, as in the instance of the rings of Saturn, thrown off originally in the same way from the planet, as the planet itself was thrown off from

the primary body, the sun. If the zones are *not* thus uniform in their constitution, they break up into one or more masses, having the same degree of speed and the same orbital line of progress as the parent zone possessed before its separation from the main body, and rotating in consequence of the excess of speed existing in the outer as compared with the inner portion of the zone. Thus, it is presumed, our world and the other planetary bodies was formed from the sun; and thus, by a repetition of the same process, were the moon, and other planetary satellites formed from the planets.

5. *Original Dimensions of the Sun.*—If this view be correct, the original dimensions of the Sun in its undivided state were identical with the dimensions of our entire solar system; and the subsequent history of its condensation is strikingly told by the several orbits of the planets; each of these marking the Sun's dimensions at the time the planet was dismissed into space, to lead a comparatively independent existence.

6. *Original Dimensions of the Earth.*—Our globe, again, must have extended to the line now traced by its satellite, the moon; must have been then 482,000 miles in diameter, instead of nearly 8,000 miles, as at present; and must have taken twenty-nine days and a half to rotate on its own axis, instead of twenty-four hours.

7. *Common Direction of the Planetary Bodies, evidence of a common origin.*—Of course, it is indispensable to such a theory, that the planets and their satellites should all show their original unitary movement in their present individual movements. And this they do. The planets have one common direction round the Sun; the satellites move in the same direction, whilst also encircling their respective planets: and both planets and satellites, while revolving each on its own axis, make that revolution also in the same general direction, viz., from west to east, which is the Sun's own movement round its axis.

8. *The Origin of the Planetary Bodies also illustrated in their respective densities.*—The planets and satellites should also, to be in accordance with this theory, possess varying degrees of density. The heavier portions of the parent body must have been the most central; the lighter, those nearest the extremity, and therefore the first to be thrown off. This also is essentially the truth. The planets nearest the Sun are the most dense, the farthest from it the least so; the exceptions being only such as may be ascribed to some of the lesser influences that may have modified the general law. The order of the chief planets, as regards their different degrees of proximity to the Sun, is—Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus: now, Mercury, the planet nearest the sun, is almost three times as dense as the Earth; whilst the Earth itself is nearly four times as dense as Uranus, the body farthest from the Sun of those we have named.

9. *Chemical proof of Laplace's Theory, drawn from the Earth's Elements.*—Chemical analysis of the component parts of the earth's body leads us, by a more exact and trustworthy route, to corresponding conclusions. All known substances, however varying in apparent origin, structure, qualities, and uses—from the humblest pebble beneath our feet, up to the highest human organization—may be resolved into about fifty-five elementary substances; and which substances, it is presumed, are not themselves compound; that is to say, are not capable of further division. Forty of these are metallic bodies, twelve non-metallic, and three intermediate between the two. Turning from the consideration of the foregoing theory of the earth's material origin, to these elements of the earth itself, one naturally asks—Can these bodies have ever been in the state of heated vapour, or "fire-mist," as it has been called? The answer is easy and satisfactory. Four of the non-metallic bodies exist permanently gaseous: these are oxygen, hydrogen, nitrogen, and chlorine. One-half the solid matter of the globe is estimated to consist of oxygen. It forms a fifth of the atmosphere; eight-ninths of water; and a large proportion of every kind of rock. When freed from its connexion with solid bodies, it expands to two thousand times its former bulk. What happens to freed oxygen, would occur with chlorine and other substances similarly disengaged. Look at water, also—forming ice at a temperature lower than 32° —becoming steam at 212° . All these facts point to the conclusion, that every one of the substances of the globe

might be converted, under certain circumstances, into gas; and, of course, therefore, tend greatly to confirm the hypothesis, that from gas they all came.

10. *Heat the cause of Original Expansion.*—Condensation and expansion are, thus, the two opposite processes which the world exhibits, when its present is compared with its original condition. Cold is connected with the one, heat with the other. Was heat, then, the influence that originally kept in a state of vapour all the varying substances that comprise ourselves, and everything around us that we can touch or see? Most probably it was. On descending into the bowels of the earth, as by means of mines and other deep excavations, we find that as soon as we have passed below the regions affected by the Sun and other external influences, there is a constant increase of heat as we descend lower and lower. Miners, as is well known, are often obliged to work absolutely naked. It has been calculated that, for every fifteen or sixteen yards of descent, the heat increases one degree of Fahrenheit. Volcanoes, and hot springs of water, seem also to suggest subterranean heat as their origin.

11. *Density of the Earth only to be explained by the hypothesis of Central Heat.*—The known degree of density of the earth is such as can only be explained on the hypothesis of some interior Force lessening the effects of the concentration of such a mass of solid matter. The surface rocks are only two and a half times as heavy as water; and although the average density of the globe is more than five times as heavy as water, how small is that proportion still to what must have been the weight of the whole earth, were there no antagonistic influences! Water at the depth of 362 miles below the surface acquires by compression the density of quicksilver; whilst marble at the centre of the earth would be one hundred and nineteen times as dense as it is on the surface. Heat is, probably, the antagonistic force.

12. *Formation of the Igneous Rocks also supports Laplace's Theory.*—In descending below all these rocks, whose formation and contents evidently point to periods subsequent to the original creation of the globe, we find, underlying the whole, as a kind of natural and universal floor, granite and similar rocks, known as igneous rocks, because they appear to have been produced in their present state by the action of heat, strong enough to have kept their constituents in a state of fusion, and which on cooling crystallized. This great fact seems further to corroborate the preceding theory.

13. *So also does the Form of the Earth.*—Lastly, the figure of the globe is known to be precisely that which would result from the revolution on its axis of a body in a fluid or semi-fluid state; and which, as heat passed off by refrigeration from the surface, would consolidate and remain permanently in the shape in which it now exists—that of a globe a little flattened at the poles.

14. *Present state of the Interior of the Earth.*—Whether the interior be now entirely solid, or partially fluid, is a matter unsettled even as a theoretical question. The answer depends upon a very difficult problem. Which exerts the greatest power—the condensing pressure of the superincumbent mass at or near the centre, or the expanding force of the heat?

15. *Other Theories as to the cause of Heat in the Interior.*—We must not omit to state, that there are other views maintained as to the cause of interior heat. Some suppose that it is heated by the access of water, or other oxygenised bodies, to chemical substances in the interior—an hypothesis that has been also generally applied to the explanation of volcanic eruptions. Another hypothesis is, that electricity may be the cause of the intense heat; and some who supports this theory, object to the one we have explained as the most credible, on the ground of certain experiments which have been made, and which seem to show that substances cannot, under ordinary circumstances, be maintained at a high temperature while in contact with others of a lower one. Presuming this to be correct, it only seems to show that special combinations of chemical force must be at work, to keep up this perpetual heat. Surely no student of Chemistry will find it difficult to realise the probability, not to say possibility, of this.

16. *Liebig's chemical Views in support of Laplace's Theory.*—We conclude this Introductory Chapter by a passage from the latest work of our latest chemical philosopher, Liebig, which supports incidentally but strongly the theory we have endeavoured to explain and illustrate. "Expansion of heat," he says, "implies that the atoms of which a substance is composed separate to a certain distance from each other. Now since a certain contiguity of atoms is a necessary condition for the action of chemical affinity, it is obvious that by the mere effect of heat a number of chemical combinations must be resolved into their constituents; and this, indeed, always in cases where the influence of heat causes the distance between the ultimate particles to extend beyond the sphere of chemical attraction. This necessarily causes a separation. When the heat decreases, the atoms again approach each other, and at a certain point of proximity, combination again ensues. We may imagine that at a temperature immeasurably high to us, substances can exist in one and the same place without combining, although they may possess the very strongest affinity for each other; and that, because this high temperature neutralises their affinity—opposes an insurmountable resistance to its operation. So, undoubtedly, the constituents of the earth, when they possessed an exceedingly high temperature, were arranged in quite a different manner from that in which we find them at present. Nay, it is not impossible that they should have floated through each other as in a chaos, and that this chaos formed itself into our present minerals and rocks only when this temperature was greatly lowered. Let us suppose all the elements composing the earth, by the influence of a great heat, to be brought into the same state in which oxygen and hydrogen gas exist at the common temperature of the atmosphere, the earth would be an enormous ball of nothing but gases, which everywhere would uniformly mix without entering into combination, just as is the case with oxygen and hydrogen, despite their exceedingly great affinity."



CAUSES AND CONSEQUENCES OF INDIVIDUAL CHARACTER.

IT may not be devoid of amusement to trace the consequences which would have ensued, or rather which would have been prevented, had the father of some eminent character formed a different matrimonial connexion. Suppose the father of Bonaparte had married any other lady than the one who was actually destined to become his mother. Agreeably to the tenor of the preceding observations, it is obvious that Bonaparte himself would not have appeared in the world. The affairs of France would have fallen into different hands, and have been conducted in another manner. The measures of the British cabinet, the debates in parliament, the subsidies to foreign powers, the battles by sea and land, the marches and countermarches, the wounds, deaths, and promotions, the fears, and hopes, and anxieties of a thousand individuals would all have been different. The speculations of those writers and speakers who employed themselves in discussing these various subjects, and canvassing the conduct of this celebrated man, would not have been called forth. The train of ideas in every man interested in public affairs would not have been the same. Pitt would not have made the same speeches, nor Fox the same replies. Lord Byron's poetry would have wanted some splendid passages. The Duke of Wellington might have still been plain Arthur Wellesley. The imagination of the reader will easily carry him through all the various consequences to soldiers and sailors, tradesmen and artisans, printers and booksellers, downward through every gradation of society. In a word, when we take into account these various consequences, and the thousand ways in which the mere intelligence of Bonaparte's proceedings, and of the measures pursued to counteract them, influenced the feelings, the speech, and the actions of mankind, it is scarcely too much to say, that the single circumstance of Bonaparte's father marrying as he did has more or less affected almost every individual in Europe, as well as a numerous multitude in the other quarters of the globe.—*Essays on the Formation and Publication of Opinions.*

REVIEWS OF NEW PUBLICATIONS.

[UNDER this head, reviews of new publications will, as we announced in the Preface to the last volume, appear regularly in every number. The field of criticism which it is thus intended to occupy, will extend from mere school-books—properly so-called, up to the best productions in Literature, Art, Music, Science—in its various branches, History, Natural History, and Industrial Economy, that may be fairly considered necessary to high educational development, whether in relation to the individual or to the nation. All Books, Prints, and Music, addressed *To the Editor of the Family Tutor*, 69, Fleet Street, will be duly acknowledged on the cover: while Reviews will be given, in addition, of those works which, from their general excellence or peculiar fitness to special purposes, are judged worthy of selection. Such books will be criticised in a strictly impartial spirit, without fear or favour, though not without that liberal and gentlemanly tone which should ever characterise the relations of men of letters.]

NEW DISCOVERIES IN CONNEXION WITH THE VITAL FORCE.

Researches on Magnetism, Electricity, Heat, Light, Crystallization, and Chemical Attraction, in their relations to the Vital Force. By KARL, BARON VON REICHENBACH, Ph. Dr. Translated and Edited at the express desire of the Author, with a Preface, Notes, and Appendix, by William Gregory, M.D., F.R.S.E., Professor of Chemistry in the University of Edinburgh. London: Taylor, Walton & Maberley.

WE have now arrived at too late a period of the world's history, hastily to reject discoveries (so-called), either because they are new, or because they seem to transcend our powers of understanding. A shallow philosophy has long endeavoured to condemn everything as superstitious and unreal, that was mysterious. We are now fast arriving at so opposite a conclusion, that, with a pardonable exaggeration, one might almost say, that mystery is the normal aspect of all the phenomena of being. We seem nowhere able to penetrate far below the surface of things. So inexhaustible are the wonders of God's creation!

Before we enter on the subject of this paper, let us say a few words on the parties who are concerned in bringing it under public notice. The author of the book in

question is the Baron Von Reichenbach. It will be sufficient evidence of his character and fitness, to say that the most illustrious of Swedish philosophers, the late Berzelius, not only took a deep interest in the Baron's researches, but expressed his conviction that they could not have been in better hands. The work itself was published in its earliest form in Liebig's *Annalen*; thus receiving the sanction of the greatest, perhaps, of living philosophers. Lastly, the translator, Professor Gregory, is, we need scarcely say, a man of the highest character, and most profound scientific acquirements. Under such auspices is the work introduced to us.

The internal evidence is in accord with the external. The book is, in method, a model of logical order and acumen. It reminds us, in this respect, of Locke's famous work on the Understanding. All the discoveries recorded are based on experiment; commencing first on unhealthy persons—for such seemed, at the outset, alone capable of manifesting the novel phenomena—but extended gradually to those in perfect health; who, to the author's great satisfaction, proved eventually to be perfectly sensible to all the varying and wonderful effects of the new Force the Baron had discovered. Thus the morbid condition of the first class could no longer be urged, as weakening the value of the results. We need only add to these general remarks, that the Baron has pursued these investigations unremittingly for several years together; that he publishes the names, vocations, and residences of all the persons experimented on—most of them well-known inhabitants of Vienna; and that Professor Gregory has personally confirmed, by his own experiments, the existence of the new power announced by the Baron. Our space will not, of course, allow us to describe in detail (and, for the most part, highly interesting detail it is) the experiments performed; we can only sum up the conclusions.

The old popular notion, that the magnet has a sensible action on the human frame, is proved to be a fact. If we make downward passes with strong magnets, having a supporting power of about ten pounds, along the persons of from fifteen to twenty individuals, but without touching them, we shall always find one or more among the number affected in a peculiar way. These

persons the author calls *sensitives*. Persons whose sleep is more or less disturbed by the moon, or who suffer from nervous disorders, are peculiarly open to such impressions.

The perceptions of the magnet's influence group themselves about the senses of touch and sight;—of touch, in the form of sensations of apparent coolness and warmth; of sight, in the form of luminous emanations, visible after remaining long in the dark, and flowing from the poles and sides of magnets.

This exciting power does not belong merely to artificial steel magnets or to the loadstone; but appears to exist universally through all nature. Thus there are, first, the earth itself: then the moon; all crystals, natural and artificial, which act in the line of their axes; heat, friction, electricity, light—including the solar and stellar rays; chemical action especially; organic vital activity—both that of plants and animals, and especially of man; lastly, of the whole material universe.

The cause of all these phenomena is a force existing in nature, embracing the whole universe, and distinct from all known forces, and to which force the author gives the name of ODYLE.

Odyle is distinct from heat. Although odylic emanations excite sensations of icy coldness as well as of burning heat, they do not in the slightest degree affect the most delicate thermometer. The right hand excites cold in its odylic action on sensitives, while, of course, its touch raises the thermometer. Solar rays act similarly in both cases. Chemical processes generally raise the thermometer by disengaging heat; their odylic emanations are cold. Heat extends slowly, and to but short distances by conduction; odyle moves much more rapidly, and to considerable distances. Sensitives will perceive the odylic action of a crystal, a magnet, or a human being, through thick walls, in a few seconds, without being previously aware of their presence; the most intense heat would take hours to be equally perceptible. These, and hosts of similar proofs, which the author's elaborate and severe tests have enabled him to accumulate, show that heat and odyle are quite distinct.

Odyle is distinct from electricity. The phenomena of the former occurs frequently

where those of the latter are altogether absent. Odyle distributes itself through the whole mass of a substance; free electricity stratifies itself on the surface. Odyle may be communicated, for a time, to all bodies; whereas, Dr. Faraday could not anywhere collect electricity, even in a room prepared with this view; the whole instantly escaping by the surface of the walls, &c. Odyle passes off slowly from bodies to which it has been conveyed, taking from a quarter of an hour to several hours in the process. Electricity is instantly removed from a body charged with it, by the merest contact, or with a finger. Odyle excites a violent action on the irritable nerves of sensitives, while the same persons perceive nothing more than is ordinarily felt in the action of electricity. Many similar evidences are also given by the Baron.

Odyle is distinct from magnetism. It does not attract iron, nor the magnet; bodies possessing it, do not, like the magnetic needle, assume any particular direction from the action of the earth's magnetism, nor affect the magnetic needle itself; when suspended, they are not affected by the proximity of an electric current, nor do they induce a current in metallic wires. Odyle is not, therefore, magnetism. While this force appears everywhere where magnetism appears conversely, magnetism is not always to be found when odyle is present.

Odyle possesses polarity. Its properties differ at the opposite poles of the magnet. At the northern pole, on the downward pass, a sensitive feels a sensation of coolness, and sees, in the dark, blue and greyish light; at the southern pole warmth is felt, and red, or reddish yellow, and reddish grey light perceived. The northern pole also excites pleasurable, the southern distressing, sensations. As with ordinary magnets, so with crystals, plants, animals, &c.; only, that as organisation advances, the polarity becomes more complex. Thus in all the individual organs there are innumerable subordinate polarities. Man's entire left side is in odylic opposition to his right; and, of course, the right hand, or right foot, to the left hand and left foot; for the extremities exhibit the odylic force in its greatest strength. Men and women are not qualitatively different.

The odylic force is conducted to distances not yet ascertained, by all solid and

liquid bodies. Metals, glass, resin, silk, water, are all perfect conductors. It is also conducted, though less perfectly, by bodies of less continuous structure, such as dry wood, paper, cloth, &c. The rate of conduction is such, that the hand, moved rapidly, can almost follow it along a stretched wire.

Odylic has, like heat and light, a twofold property; in one sluggish, which slowly communicates with, and slowly leaves bodies; in the other, capable of being radiated to distances with such rapidity, that healthy sensitives will experience the odylic effects through a whole suite of rooms, of magnets, crystals, and the human body, without sensible lapse of time. This light may be concentrated by a lens into a focus.

Electric currents, though not directly producing odylic manifestations in sensitives, do act upon the latter with great power, by previously exciting the odylic action in other bodies, which then act upon the sensitives placed within their sphere.

The light diffused by bodies excited by the light force, is so feeble as only to be perceptible to persons of highly susceptible nervous organization, and to them only after remaining in the most absolute darkness for a long time—perhaps two hours. During that time, not a trace of natural light must be permitted to reach the eye. The power of seeing the odylic light does not depend merely on acuteness of vision, but in some disposition of the whole nervous system, with which we are not yet acquainted. The luminous appearances are very various, and in some instances exquisitely beautiful. Atmospheric substances exhibit a mere feeble glow, similar to phosphorescence, and surrounded by a delicate luminous veil of downy flame, and which, in different bodies, takes different colours—blue, red, yellow, green, purple, but chiefly white and grey. The elementary bodies, metals especially, shine with the greatest vividness. *All things give out light.*

Where the light is polar, as in magnets and crystals, it forms a kind of flamy current, exhibiting all the colours of the rainbow. Human beings are luminous over nearly the whole surface, but especially on the hands—palm of the hands, points of the fingers, eyes, certain parts of the head,

pit of the stomach, toes, &c. The odylic light from the fingers issues forth in flaming streams in the line of their length. All these, and the other flames described by the Baron, may be moved by currents of air, as by blowing on them. When they meet solid bodies, they curve round them like ordinary flame. The odylic flame has, therefore, a material character.

Lastly, in many morbid states, especially in cataleptic fits, a peculiar kind of attraction is observed to be excited by the odylic poles of magnets, crystals, and the *human hand*, on the hands of diseased sensitives. This fact, if true, is so important in its bearing on the question of the truth or falsehood of Mesmerism, that we must transcribe one of the experiments upon which the Baron founds his general law. "When," says the Baron, "Madlle Nowotny, in the cataleptic state, lay without consciousness or motion, but without spasms, and when a steel magnet, capable of supporting about twenty pounds, was approached to her hand, the hand adhered so firmly to it, that when the magnet was raised, or moved sideways, backward, or in any direction whatever, her hand stuck to it, as if attached in the way in which a piece of iron would have been. She remained utterly unconscious all the time; but the attraction was so strong, that when the magnet was moved towards her feet, farther than her arm could reach, she did not let it go; but although insensible, raised herself in bed, and followed the magnet with her hand as far as she could possibly do, so that the effect was the same as if some one had seized her hand, and by means of this, drawn, or bent her body forward towards the feet. When the magnet was at last moved so far that the body could not be moved or bent farther, so as to enable her to follow it, she was compelled to let it go, but remained then in the manner usually observed in cataleptics, fixed and immovable in the position into which she had been brought. This I saw daily, from six to eight, P.M., at which time the fits of catalepsy occurred; and the fit was usually witnessed by from eight to ten persons, physicians, natural philosophers, chemists, and others interested in the science." This single case may be taken as illustrative of the extraordinary light the book throws on the whole subject of Mes-

merism. The passage relating to the *magnetic baguet* of Mesmer is a delightful evidence of the author's power of at once explaining by exact scientific facts, whatever is true in our popular beliefs, and of abolishing for ever that which is false. His explanation of the Aurora Borealis is also highly interesting and probable.

Of course we are yet but on the threshold of the vast subject the author has opened to us, and it would seem premature to attempt to draw practical benefits from so mysterious a force. But the Baron does already show some important results in connexion with the laws of health. Night, sleep, and hunger, depress and diminish the odylie influence; while food, daylight, and working activity, increase and intensify it. Now as the time of the sun's going and coming, to call us into action, or to recommend us to repose, is a fact established, and beyond our control, and as all the influences should be in harmony, it follows that we should so apportion our meal-times and periods of work, as to make the climax of odylie force they develop identical in point of time with the climax of the odylie influence emanating from the sun. Our chief meal should therefore be not later than noon, and we should retire to rest early in the evening, and rise at an early period of the morning. One of the most extraordinary facts pointed out by the author is this, that in sleep the odylie power is transferred from the front of the head and brain to the back of both—the hind-head, as the Baron calls it—the absence or presence of the sun being the exciting cause of the change. Hence the exhaustion of night labour, being pursued—as it must be, if the Baron be correct—in direct opposition to the laws of our being.

It will not be supposed that we shall attempt to convey anything like a complete notion of the contents of this very remarkable, and, as we believe it will prove, very valuable book. It is one to be closely studied at home; and we can promise our scientific readers they will experience a more than ordinary interest in so doing. We shall conclude with a very interesting explanation of a phenomenon that has often suggested the wildest speculations to the superstitious, and which has puzzled those who, without being at all credulous, were not inclined to dismiss the matter sum-

marily, as a popular absurdity. We refer to the question of

LIGHTS OVER GRAVES IN CHURCH-YARDS, as illustrated in the case of the blind German poet, Pfeffel.

Pfeffel had engaged a young Protestant clergyman, of the name of Billing, as amanuensis. The blind poet, when he took a walk, held Billing's arm, and was led by him. One day, as they were walking in the garden, which was at some distance from the town, Pfeffel observed that, as often as they passed over a certain spot, Billing's arm trembled, and the young man became uneasy. He made inquiry as to the cause of this. Billing at last unwillingly confessed, that as often as he passed over that spot, he was attacked by certain sensations, over which he had no control, and which he always experienced where human bodies lay buried. He added, that when he came to such places at night, he saw strange (*Scoticè*, uncanny) things. Pfeffel, with the view of curing the young man of his folly, as he supposed it to be, went that night with him to the garden. When they approached the place in the dark, Billing perceived a feeble light; and when nearer, he saw the delicate appearance of a fiery, ghost-like form, hovering in the air over the spot. He described it as a female form, with one arm laid across the body, the other hanging down, hovering in an upright posture, but without movement; the feet only a few hand-breadths above the soil. Pfeffel, as the young man would not follow him, went up to the spot, and struck at random all round with his stick. He also ran through the spectre, but it neither moved nor changed, to Billing's eyes. It was as when we strike with a stick through a flame; the form always appeared again in the same shape. Many experiments were tried during several months; company was brought to the place, but no change occurred; and the ghost-seer adhered to his former assertions, and, in consequence of them, to the suspicion that some one lay buried there. At last, Pfeffel had the place dug up. At a considerable depth, they came to a firm layer of white lime, about as long and as broad as a grave, tolerably thick; and on breaking through this, the bones of a human being were discovered. It was thus ascertained that some

one had been buried there, and covered with a thick layer of lime, as is usually done in times of pestilence, earthquakes, and similar calamities. The bones were taken out, the grave filled up, the lime mixed up with earth and scattered abroad, and the surface levelled. When Billing was now again brought to the place, the appearance was no longer visible, and the nocturnal ghost had vanished for ever! The Baron remarks, it is hardly necessary to point out to the reader what he thinks of this story, which caused much discussion in Germany, because it came on the authority of the most trustworthy man alive, and received from theologians and psychologists a thousand frightful interpretations. To the Baron's eyes, it belonged entirely to the domain of chemistry, and admitted of a simple and clear scientific explanation. A human corpse is a rich field for chemical changes, for fermentation, putrefaction, gasification, and the play of all manner of affinities. A layer of dry quick-lime, compressed into a deep pit, adds its own powerful affinities to organic matters; rain-water from above is added; the lime first falls to a mealy powder, and afterwards is converted, by the water which trickles down to it, into a tallow-like external mass, through which the external air penetrates but slowly. Such masses of lime have been found buried in old ruined castles, where they had lain for centuries; and yet the lime has been so fresh, that it has been used for the mortar of new buildings. The carbonic acid of the air, indeed, penetrates to the lime; but so slowly, that in such a place a chemical process occurs which may last for many years. The occurrence in Pfeffel's garden was, therefore, quite according to natural laws; and since we know that a continual emanation of the flames of the crystalline force accompanied such process, the fiery appearance is thus explained. It must have continued until the affinities of lime for carbonic acid, and for the remains of organic matter in the bones, were satisfied, and finally brought into equilibrium. Whenever, now, a person approached who was, to a certain degree, sensitive, but who might yet be, or appear, in perfect health, and when such a person came within the sphere of these physical influences, he must necessarily have felt them by day, like Mademoiselle Maix, and seen them by night

like Mademoiselle Reichel. Ignorance, fear, and superstition, would now give the luminous appearance the form of a human spectre, and supply it with head, arms, and feet; just as we can fancy, when we will, any cloud in the sky to represent a man or a demon.

ALMANACKS.

The Family Almanack and Educational Register for 1852. London: J. H. Parker.

THE tribe of Almanacks grows more and more numerous, but we cannot say that their increase in excellence corresponds with the increase of number. This is a pity, for with many, the almanack is almost the only household book—the Bible, of course, excepted. It is, therefore, a valuable medium for conveying information to those who would, otherwise, never get it. For these persons—the millions—we want cheap and informing almanacks, and if they are somewhat anusing, all the better. There is another class of persons, the very antipodes in some respects of the former, who read much, and desire to make the best use of their time in their reading, and who especially desiderate books which compress into small, but sufficient space, and luminous order, all those statistical or other facts which lie scattered in many quarters—as parliamentary blue books, and the like. Here, again, the almanack seems just the book for the purpose, each great class of society having its own, with all sorts of special facts likely to be useful to it, pressed into the service. Such is the almanack before us, which is one of peculiar value to the heads of families, and generally serviceable to all friends of education. It describes, in unusual fulness, whatever is most likely to need description for such parties; and especially the universities, colleges, foundation and grammar schools, training institutions for teachers, national education, &c. Let us remark, by way of comment, on the account of infant schools, that Oberlin was *not* their founder, as regards this country, but Robert Owen, who commenced them at Lanark, and who trained the first of the infant school teachers, Robert Buchanan; that gentleman having left New Lanark to superintend a similar institution in London. We have nothing to do with Mr. Owen's views in

this publication, but the facts stated are undeniable, and have been again and again confirmed by all the parties concerned—from the Marquis of Lansdowne downwards. Let us notice, in conclusion, that the great bulk of this handsome volume is devoted to an alphabetical account of all the public schools of the country. We subjoin an example, which is more than usually brief:—

“Blackburne, Lancashire. Free Grammar School. 1566. *Patrons*: Fifty governors incorporated. *Freedom*: Unlimited. *Income*: From endowment in 1837, £120. *Master*: Rev. James Bennett. *Scholars* in 1851: Not one. This is one of the cases in which some one should be empowered, by a cheap and summary process, to make the school useful to the parishioners. The editor has received accounts from several persons respecting the state of this school, which, from some disagreement, is not only of no use to the neighbourhood, but a positive harm, as its existence prevents a well-qualified teacher from opening a school.”

Aunt Jane's Verses for Children— London :
C. GILPIN,

ARE among the purest, sweetest, and altogether most suitable for the purpose, of any that we have met with for some time. The authoress, Mrs. T. Crewdson, is one of the few teachers who know how to enter into a child's sympathies, and command their attention, without descending to puerility or common-place. She has, evidently, faith in the simple beauty of the young imagination, and *elevates*, not *lowers* herself, to the demand which that vivid faculty makes upon all who would nourish it with appropriate food. We wish, for the benefit of some of our younger readers, we could quote one of the poems entire, but our space forbids more than a single stanza, and that we take, not from one of the little stories, or incidents, or rural pictures, but from a piece of a more didactic turn. The little volume is illustrated by some charming engravings. Parents need not desire a more appropriate Christmas or New Year's gift for their children.

“TRY AGAIN.

“Gentle young maidens, and brave little men,
Never despair! Try *again* and *again*.
Life hath no royal bowers, fair to behold,
Draped with vermilion and paved with gold;
Duty's no garden path sodded with moss,
Smoothed from the rugged, the crooked, the cross;

Time hath no space to be languid or weary,
Forward the march of the hopeful and cheery!
Not to the swift is the battle of life,
Not to the strong is the guerdon of strife,
Not to the proud is the crown of such
Only the patient, the steadfast, and lowly,
Win the true wreath that is fadeless and holy;
The bold and ambitious may strive all in vain,
The goal will be reached but by *trying again*.”

MR. MACHEN'S SCHOOL-BOOKS.

Galbraith's School and College Virgil.

Dr. Young's Pronouncing and Etymological Spelling-book.

The First French Teacher, by Désiré Pontet.

The Hand-book of English Grammar.

European Geography made interesting. By
J. S. GASKIN.—London: SAMUEL J.
MACHEN.

THE compilers of the School-books above-named seem to be animated by a common desire to improve upon the older publications of the same kind. All such attempts, when carried out with corresponding ability, will meet with cordial help from the *Family Tutor*. The most important of these five books, *Galbraith's School Virgil*, we reserve for more lengthened notice in connexion with some other classical works that may be fitly reviewed with it. M. Pontet's little work we shall also pass over for the present, as we should like to see his plan as a whole, when complete. Among the improvements that we have especially observed in the other three works, we may mention the following:—Young's *Spelling-book* shows what it desires to do, by illustrating, in a preface, what has been done in *Carpenter's Spelling-Assistant*, one of the most popular and prevalent of such school compilations. In four tables, Dr. Young collects from Carpenter a number of words, consisting, first, of those to which are attached meanings imperfect or ridiculous; second, meanings utterly false; and so on. We select one or two examples, adding, from the subsequent pages, Dr. Young's own explanation:—

CARPENTER.	DR. YOUNG.
Brain, <i>s. of the head.</i>	Brain, <i>s. the seat of thought.</i>
Seam, <i>s. of a garment.</i>	Seam, <i>s. a sewed joining.</i>

The one, it will be seen, merely suggests some notions about the thing referred to; the other describes the thing itself. There is a pleasant individuality about this book.

The author has a great veneration for Dr. Johnson, as the most illustrious of English lexicographers; and does not care to prevent his admiration breaking out at every favourable opportunity. Still less does he disdain to imitate his sounding style; as, for instance, in the following short paragraph:—

"Without the sanction and authority of our great, judicious, and elegant lexicographer, we should be reluctant to use words that necessity does not absolutely require, or grace peculiarly recommend. Unless purity and vigour keep pace with innovation, extension enfeebles, and variety corrupts. It is easier to augment than to consolidate, and to diversify than to improve. Novelty may dazzle ignorance, and change may gratify caprice; but unceasing additions to a language so copious as our own, would soon enlarge it into a wilderness that art would never venture to cultivate, and industry never hope to reclaim."

The Glossary is a valuable feature of the *Grammar*. This includes some seven or eight hundred of the words used in the treatise, arranged in alphabetical form, and showing whether the root be from the Hebrew, Greek, Latin, Italian, or French languages. We append an example:—

"Accent. Lat. *ad*, to; *cantus*, a song. Stress of the voice; to pronounce forcibly."

The *European Geography* is rightly characterised, as "made interesting." We do not know that we ever before met with a school-book so interesting to persons of all ages. The mode adopted to obtain this end is worth explanation. The book is arranged in divisions, as the World, Ireland, England, &c. (the precedence shows the local home of the book—Ireland). Within these divisions all the geographical matters relating to each, are shaped into questions, accompanied by the answers. To one or more of these paragraphs, arranged as question and answer, a note is appended, giving some most happily chosen literary quotation, illustrative of the text; or occasionally additional information from the compiler. These notes show a very large acquaintance with the writings of the best travellers and historians. The following example will illustrate our remarks. We first give one of the paragraphs from the text, and then the foot-note attached to it.

"42. When did the Poles make the last vigorous, but unsuccessful effort, to shake off the yoke of Russia?"

"A. In 1831, when the battle of Warsaw, the greatest in Europe since that of Waterloo, was fought between the Russians and Poles." *

* THE FALL OF POLAND.

"The fatal issue of this revolution is well known. The Polish nation exerted its utmost strength, and the whole force of the colossal empire was brought against it, and, in spite of prodigies of valour, crushed it. The moment, the only moment when, gallant, chivalric, and heroic Poland could have been saved and restored to its rank among the nations, was suffered to pass by, and no one came to her aid. The minister of France threw out the bold boast, that a hundred thousand men stood ready to march to her assistance; but France and all Europe looked on, and saw her fall. Her expiring Diet ordered a levy *en masse*, and made a last appeal, in the name of God, in the name of liberty, of a nation placed between life and death, in the name of kings and heroes who have fought for religion and humanity, in the name of future generations, in the name of justice and the deliverance of Europe; but her dying appeal was unheard! Her last battle was fought under the walls of Warsaw; and then she would not have fallen, but even in Poland there were traitors. The Governor of Warsaw blasted the laurels earned in the early battles of the revolution by the blackest treason. He ordered General Romarino to withdraw eight thousand soldiers, and chase the Russians beyond the frontier at Breze. While he was gone, the Russians pressed Warsaw; he could have returned in time to save it, but was stopped with directions not to advance until further orders. In the meantime, Warsaw fell, with the curse of every Pole upon the head of its governor. The traitor now lives ingloriously in Russia, disgraced and despised, while the young lieutenant is an unhappy, but not unhonoured exile in Siberia."

"So ended the last heroic struggle of Poland. It is dreadful to think so; but it is greatly to be feared that Poland is blotted for ever from the list of nations. Indeed, by a late imperial ukase, Poland is expunged from the map of Europe; her old and noble families are murdered, imprisoned, or in exile; her own language is excluded from the offices of Government, and even from the public schools; her national dress proscribed; her national colours trampled under foot; her national banner (the white eagle of Poland) in the dust. Warsaw is abandoned, and become a Russian city; her best citizens are wandering in exile in foreign lands, while Cossack and Circassian soldiers are filing through her streets, and the banner of Russia is waving over her walls."

INDUSTRY.—It is not only the instrument of improvement, but the foundation of pleasure. He who is a stranger to it, may possess, but cannot enjoy; for it is labour only which gives relish to pleasure. It is the appointed vehicle of every good to man. It is the *indispensable* condition of possessing a sound mind in a sound body.
—Dr. Blair.

CONCHOLOGY;

OR,

A STROLL BY THE SEA-SIDE.

BY ROCHESTER.

You must not set me down for a misanthrope when I confess, that I should not dislike residing alone on the top of a pillar, like Saint Simeon Stylites, only I must have books, and an occasional peep at terrestrial society. Indeed, I am neither quite so bad as the Syrian fanatic, nor as Timon the Athenian, who had but one friend, Apemantus, in the world, and who, when they were dining together at the festival of Choes, and Apemantus exclaimed at the pleasures of the entertainment—ironically, poor wretch, I presume—was bearish enough to reply: “Yes, if you were not here.” I am more of a philosopher than he, and when I chance to fall in with companions, endeavour to partake the pleasures of the moment, as counselled by the Venusian bard; and, giving them the benefit of my little store, strive also to extract a few honey-drops from their flower-beds, however barren they may be. It was thus that, meeting with young Harrington and his sister, Annie, last evening, as I was going down to the beach for my usual walk, I joined with them and wandered as far as Cowry Cave, and assisting them in their conchological researches, received in return two hours of the light-heartedness of youth—of the fresh elasticity which illuminates intelligent boyhood.

Reginald Harrington is sixteen, and his sister two years younger; and having known me intimately all their lives, there is none of that suspicious icyness betwixt us which too frequently prevents free communication between children and those who are their seniors. They tell me their faults and their troubles, their likings and dislikings, without restraint; and, for my part, when I have been chattering with them, as I have done occasionally for a whole afternoon, about things that some folks would stigmatise as nonsense, I have felt happier—a deal more refreshed and satisfied, than I do when Mrs. Belgrave shakes me by the hand and wishes me good morning (though it is four P.M.), with an entreaty that I will be at her dinner-party next week, as she is going to

have Professor Stone, who has crossed the Andes, and Dr. Bolus, whose father was physician to Voltaire, or some such notable; or when Major Ranunculus holds me by the button-hole for an age, discoursing gravely about bruised oats for horses, or that everlasting theme, the battle of Waterloo! Although, I say, I manage to gain some nourishment from such arid deserts as these whenever I chance to be travelling their way, yet the young Harringtons are, beside them, as green meadows, undulating corn-fields, bright and sunny spots! And yet I talk of living on the point of Cleopatra’s Needle—in the lodge of a cucumber garden! Hush! we will say no more about that, just at present; I don’t think, now, I shall make a good recluse. Let us return to our sheep, namely, Reginald and Annie, who are waiting to stroll across the sands with me.

“Oh, Rochester,” they exclaimed, as I came towards them, having loitered behind to speak to an old shrimp-man who was toiling along with his basket, and net, and water-clothes, “are not the waves beautiful!”

“So is the sky,” I said, coldly.

“How strangely you answer one!” replied Annie; “we know the sky is beautiful, but it is not leaping with life as are our foamy-maned sea-horses.”

“Go, then, and have a canter along the beach, if you like, since they are your pet steeds; for my part, I prefer sitting here on the close-grown turf.”

“Now, you are a very Diogenes,” Annie said, laughing; “and we thought to-night you would be so good-natured, and would tell us all about conchology. Do you know, we are going to have a cabinet, and are beginning to collect.”

“Yes,” added her brother; “now, there’s a good fellow, do go round the bay with us, Rochester. You will be able to give us the names of so many mollusks we can’t find out.”

“Well,” and I rose—“since you wish it, I suppose I must attend you on your ride, though I know I shall soon oustrip you both; indeed, I have already raced along that sweeping line of surf, and am battling with the billows that are raving yonder all hoary around Blackdown Reef. You were altogether wrong, Annie, in ranking the sea before the sky. Whence does it derive

its blue, grey, emerald, chameleon tints? whence its ceaseless, ever altering motion? You may toss your head, and wave your hands at me, Miss Annie, as much as you please, but it is the slight movement of the heart within that is the life; this is the cause, that is the effect. And so you are beginning to study conchology, and want me to tell you the Latin titles of your new-found friends?

Reginald.—Just so; now here are three shells; a pretty little tawny bivalve,* lined with shaded violet; a sort of snail, globular and buff; and this white spiral one, which is gregarious and very common on the rocks.

Myself.—I am afraid you will be much disappointed when I inform you, that although I mean to give you quite a lecture on the matter in hand, you will hear very few technical terms from me.

Annie.—Thanks, Rochester!

Myself.—For my benevolence or abstinence, eh, Annie?

Annie.—For both, of course.

Reginald.—But you may as well tell us the specific names; I am sure you know them.

Myself.—Then you must first inform me whose system you intend following—Linnæus, Leuwenhoeck, Cuvier, Lamarck?

Reginald.—Now you are quizzing us.

Myself.—It was to prevent that, that I determined on making my lecture as desultory as possible, and to have a little chat about shells, without plunging into the mysteries of limbi, auriculæ, varices, &c.; for, were I confined to talking of the squamulæ of the Chiton, or the Tinus of the Murex Babylonius, I might be tempted to mystify you a wee bit for amusement.

Reginald.—Then do as you intended, and we shall be satisfied.

“*Que c'est bien.* Let us see what general instruction can be derived from the houses of skeletonless animals, and whether we can find in them ‘*Vergmügen der Augen und des Germüths*,’† to quote the title of the work of a celebrated old German naturalist, George Wolfgang Knorr;” and, taking the shells from Harrington, I held up the wreathed white one,‡ which was to

be found so abundantly clinging to the rocks, and exclaimed—“Had this poor fish existed nineteen hundred years ago, its fate might have been far more splendid than as now, to perish all but uselessly in the possession of Reginald and Annie Harrington.”

“What do you mean?” they both cried out, eagerly.

“I mean that it might have helped to dye the garment of a Roman emperor.”

“Then it is the Murex, that produced the famous Tyrian purple,” said Reginald; “is it not so, Rochester?”

“No, it is a Buccinum, a race which rivalled the shell of Tyre in its royal property—that of bestowing on the costly robes of the magnates of antiquity a world-famed hue. Now-a-day, its precious ichor may be shed for the purpose of marking shirts, and sheets, and table-linen, for which use it is gathered on the Hampshire coast; but no longer does it bathe in amethystine scarlet the flowing drapery of kings and potentates.

‘Old times are chang’d, old manners gone,’—

and both Murex and Buccinum, destitute of romance, may wear away an idle life in the cavities of their wave-worn, tide-covered homes.

“You have chosen a most interesting study in conchology,” I continued, “for it embraces a far wider circuit than you would at first imagine; spreading its mantle over the necklaces and worthless ornaments of savage aboriginal tribes, and the superb and delicate cameos adorning the throat of civilized, ennobled, European beauty: stretching from mollusks so minute that myriads of them go towards forming one square inch,* to the vast Clam or Chama of Indian seas,† whose muscular strength is such as to crunch off a human limb in the closing of its formidable jaws; one cup of which would serve for a bath or christening font, as in the Church of St. Sulpice, at Paris; and I congratulate you both, as though you were entering on a newly-acquired estate, or setting forth on a journey with your favourite prince Percinet, Annie, whose gilded and gaily painted

* *Donax trunculus*, of Linnæus.

† “The delight of the eyes and of the mind.”

‡ *Buccinum lapillus*, of Linn.

* “The smallest of the *Infusoria*, the *Monadæ*, only obtain a diameter of 1.3000 of a line.”—Humboldt’s *Kosmos*.

† *Chama gigas* of Linn.

calash was about to whirl you through the enchanted regions of Fairy-land."

"But what shells are cameos made from?" inquired Annie, "I always thought they were carved in onyx, or some such substance."

"So they were, by the ancients; but later, the Conch took its place; and it is on that the most beautiful of modern gems are sculptured."

"The word conch, and your account of the Tyrian dye," interrupted Reginald, "brings to my mind the story of the Deluge in *Ovid*,* which I read with you yesterday,—the description of the Triton sounding a retreat, and calling back the fountains of the waters."

"Give us the words," I said; but Reginald could not recollect them, and I repeated for him the lines beginning—

"Already Triton at his call appears
Above the waves; a Tyrian robe he wears,
And in his hand a crooked trumpet bears;
The sovereign bids him peaceful winds inspire,
And give the waves the signal to retire.
His writhen shell he takes, whose narrow vent
Grows by degrees into a large extent;
Then gives it breath: the blast with doubling
sound
Runs the wide circuit of the world around."
Garth's Ovid.

"And it was a Buccinum which Neptune's trumpeter sounded?" remarked Annie, as I concluded the quotation.

I should rather say it was a Murex,† though I believe both have been employed as a horn; and even now, on the Welch mountains and in the East, may be heard the music of this primitive instrument; shepherds calling home their flocks at night, as Triton signalled to the boisterous deep; or again, to a very different purpose—pealing the alarm-note of war, or accompanying the rude dancing of negro Africans. The second shell you gave me, round, and of a pinkish buff-colour, is a Nerite,‡ one of a family noted for the beauty and variety of their tints; but to be dazzled by gorgeous colouring we must descend to the tropics, where Nature wears her most resplendent garb, clothing her flowers, birds, moths, shells, all in rainbow hues; beside which, we northerners fade into dull, quakerlike sadness, deserving indeed the

poet's epithets, "pale" and "unripened." In this, however, I should except the pretty, violet, phosphoric Sea-snail,* floating beside its bladder-raft, and the gay Pectens which flutter through the waters, yellow, pink, and purple—the butterflies of the deep."

"And the rosy glass shells, with which I decorated my card-box," added Annie.

"Certainly!" I laughed.

"And, by-the-bye, they must not be kept waiting in the anteroom; exquisite and fragile as they are, I must present them at once to your majesty, as a very lovely specimen of the Tellen clan."

Annie stooped down and held out her hand to be kissed, but none of the family in question happening to be near, she patronised a periwinkle instead. And this we know already. "Our common Turbo† or Periwinkle," I observed, "a genus of Testacea very widely scattered. In the tropical zone, profuse, elegant, and handsomely variegated; in the polar seas, a lone, dark atom, adhering to motionless or loudly crashing icebergs; while overhead, the *aurora borealis* arches the heaven with a flickering light."

"I want to get a multivalve, if I can," said Reginald, after a pause; "they must be rare, for we have not met with one yet."

"There are but few in our seas; you know the Pholas,‡ which, when cooked, makes a delicate and well-flavoured dish, and whose white, file-like valves project from the tubular holes in Blackdown Reef."

"Yes; but I considered it a bivalve, Rochester."

"If you examine it closely," I rejoined, "you will detect the several accessory plates at the back, held together by a cartilaginous membrane. The Barnacle is another multivalve, which you must dredge for, unless you should discover one attached to a morsel of water-logged wood; it is seldom they are thrown up about here, perfect, by the waves. It is this fish§ which our ancestors would have to be a goose-bearing-tree, a link between the animal and the vegetable; and oftentimes they are represented in absurd old pictures as containing the unfledged birds, while the

* *Metamorphoses*, Lib. I. Fab. 7.

† *Murex tritones*, Linn.

‡ *Nerita glaucina*, Linn.

* *Helix ianthina*, Linn.

† *Turbo litoreus*, Linn.

‡ *Pholas dactylus*, Linn.

§ *Lepas anatifera*, Linn.

complete geese and ganders swim around in pert freedom. Again, I have no doubt you may find the small dusky *Chiton fascicularis*, at low tide, decorated with its tassel-tufts, lurking gravely underneath the podded seaweed on the reef; these last you could not mistake for anything but petrified woodlice, they are such curious, stay-at-home, shagreen-clothed, little bodies!"

And here we reached Cowry Cave, and Reginald, gazing out over the calm sea, as the sun went down, quietly repeated those glorious verses of a true, but passion-blinded poet—

"Roll on, thou deep and dark blue Ocean—roll!
Ten thousand fleets sweep over thee in vain;
Man marks the earth with ruin—his control
Stops with the shore;—upon the watery plain
The wrecks are all thy deed, nor doth remain
A shadow of man's ravage save his own,
When for a moment, like a drop of rain,
He sinks into thy depths with bubbling groan,
Without a grave, unknell'd, uncoffin'd, and
unknown.

'His steps are not upon thy paths,—thy fields
Are not a spoil for him,—thou dost arise
And shake him from thee; the vile strength he
wields

For earth's destruction thou dost all despise,
Spurning him from thy bosom to the skies,
And send'st him, shivering in thy playful spray
And howling, to his gods, where haply lies
His petty hope in some near port or bay,
And dashest him again to earth:—there let him
lay.

"Thou glorious mirror, where the Almighty's form
Glasses itself in tempests; in all time,
Calm or convulsed—in breeze, or gale, or storm,
Dark-heaving;—boundless, endless, and sub-
lime—

The image of Eternity—the throne
Of the Invisible; even from out thy slime
The monsters of the deep are made; each zone
Obeys thee; thou goest forth, dread, fathomless,
alone."*

For a few moments we stood in silence, unbroken but by the befitting symphony of the falling waves; and then, turning, without a word, pursued our homeward road.

Annie was the first to speak; "Oh, Reggy! how careless of me!" she exclaimed; "I have snapped your brittle *Turritella*† all to pieces."

"And something else beside," I added; "but it is as well, for day-dreaming should be put down by law, since it wastes so much time, and renders one unfit for hard facts and rough wholesome truths; one

would not go out hedging and ditching with a pair of delicate gloves on one's hands, woven from the silken beard of the Majorca Pinna."

"Is that a shell-fish?" inquired Reginald.

"It is. You are acquainted with the mussel, which mollusk, you know, attaches itself to a stone, or mudbank, by a soft hairy substance called a byssus; and in the Pinna, whose shape is that of an unfurled fan, this excrescence is long, particularly fine, and soft as the tresses of Berenice, and has been manufactured by skilful Italian artists into hose, &c. of very beautiful fabrics.* Only reflect, I resumed, how numerous are the uses to which shells are, and have been applied: for instance, as drinking-cups† by ancient Scottish chiefs, whose names resound like martial music through the songs of Ossian; as ornaments to the modern boudoir and gilded drawing-room; as medicine, in which oyster-shells, calcined, bear a part, and the calcareous opercula of some of the *Turbo* tribe, which, under the guise of *unguis adoratus*, figured in the antique Pharmacopœia; as tablets, on which were inscribed the votes that drove Themistocles from Athens; as knives, and weapons‡ among uncouth barbarians; as sacred vessels,§ in Chinese pagodas; as money, in the wampum|| of North American Indians, and for which hundreds of tons of cowries¶ are yearly imported into England, and exported to the distant lands of Siam, Guinea, or Dahomey, in return for gold-dust, and ivory, and foreign rarities; and last, not least, as playthings and objects of delight for children of all sea-engidled nations. Again, the peculiarity of form which distinguishes some of these armour suits, more cunning in their workmanship than that of the most fastidious knight of

* It was also used by the ancients for making a cloth of sumptuous rarity, which was called *byssus*.

† "Ten shells studded with gems shall shine in Sora's towers; the blue water trembles on their stars, and seems to be sparkling wine. They gladdened once the kings of the world in the midst of their echoing halls."—*The Battle of Lora*.

‡ The *voluta episcopalis* is employed by the natives of Tanna (one of the New Hebrides in the Pacific), fastened to a handle, as a hatchet.

§ *Voluta pyrum*, Linn.

|| *Venus mercenaria*, Linn.

¶ *Cypræa moneta*, Linn.

* Childe Harold's Pilgrimage, Canto iv.

† A shell of the *Turbo* genus of Linnæus.

old, reminds us how nature loves to play pranks with a few of her children, and mark out these for loveliness, and those for whimsicality. She burdens one shell with an ever-bleeding tooth;* and spreads another† like the webbed, unsightly foot of the traditionally affectionate pelican. She adorns the patella of Cyprus with redundant beauty, writes lines of music on a volute, and mysteriously traces on the surface of a glossy Cypræa‡ the characters of Arabic. Nothing can exceed the splendour and intricacy of the miniature painting which embellishes some of these oceanic inhabitants, casting into shade the most brilliant of the antique illuminated manuscripts bequeathed to us by pains-taking, persevering monks, and bearing off the palm from the ingenious eastern engravers of the pearly nautilus; while, on the other hand, we should indifferently pass by some shells as a withered leaf, a chip of delf, a dirty, misshapen pebble, possessing neither form nor comeliness; but it is from the decayed and fetid body of the rough, greenish Mytilus§ that are extracted those globes of light, which beam with soft lustre from the diadems of monarchs, and one of which, dissolved in vinegar, formed the long-remembered, costly draught of the Egyptian queen, when she banqueted Mark Anthony. We must not, then, neglect or turn aside from those shells whose exteriors are common-place or plain, for they may hold "that within, surpassing show," they may be gifted with some noble property that would far outweigh the attractive singularity of the Ethiopian crown, the Scorpion and Cabbage-shells of Asia, the Syracusan Gondola, the Woodcock's head|| and the Poached Eggs of the Pacific, or the Midas's Ear from the island of Cayenne, and the pyramidal limpets of Magellan; and recollect, this last observation applies to more than shells."

"Bois tortu fait feu droit," said Reginald.

"A fair proverb," I replied; "and to point the moral I will add, may we ourselves, each of us, emulate real worth; strive to deserve the panegyric bestowed

by Sallust on the great Cato, 'Esse, quam videri, bonus malebat;'* and with all our searchings and all our studies, aim at obtaining that pearl of great price, to acquire which we may profitably resign all that we possess. And now let us chat about your pony, and Annie's geraniums, and whatever other provender you can lay before me."

"I had much rather you went on playing variations on your one string," interposed Annie; "have you not anything more to tell us?"

"Millions of things; from Colchester oysters, and the natives of the Lucrine Lake, to sea-mice, madrepores, and cuttlefish; and I have scarcely noticed the occupants of the houses and castles that have been the subject of our present converse—and there is a monstrous deal to be said about them; but not a word more this evening."

"Why not?"

"Because I am an admirer of the Delphic precept, 'Μηδὲν ἄγαν,' which I presume I must interpret on your account, 'Not too much of anything.' So you may bid Paganini good-night."

And our conversation for the remainder of our ramble turning on trifling topics, which, though amusing to ourselves, are not likely to interest the reader, I will conclude this paper, premising that I have half promised my young friends to accompany them on another stroll shortly; but as I am very uncertain and comet-like in my movements, and labour under the predilection for quiet, mentioned at an early part of this article, my next communication may be dated from the apex of the great pyramid of Cheops, or the lofty capital of one of the palace pillars of Tadmor in the wilderness.

HE that is well employed in his study, though he may seem to do nothing, does the greatest things yet of all others: he lays down precepts for the government of our lives, and the moderating of our passions; and obliges human nature, not only in the present, but in all succeeding generations.—*Seneca*.

* *Nerita peloronta*, Linn.

† *Strombus pes pelicani*, Linn.

‡ *Cypræa Arabica*, Linn.

§ *Mytilus margaretfusus*, Linn.

|| *Murex haustellum*, Linn.

* Sallust, Bell. Catil.



THE LAST OF THE ANGLO-ROMANS.

INTRODUCTION.

VISITING one day the Crystal Palace, I beheld, in the Fine Arts court of the British Department, several pictures exhibited as specimens of Silica Colours; one of them especially interested me—not merely for its colouring, rich, bright, vivid as it was; not merely for the artistic excellence of the design, with its skilful grouping—but chiefly for its affecting realization of a most memorable subject—Britons lamenting the departure of Romans. Returning from the Exhibition, that picture had so impressed itself on my imagination, that I spent some time in turning over the pages of our best writers on the Anglo-Roman and Anglo-Saxon periods of British history; and the result was the following short sketch:—

In the fifth century, Constantine the

Great divided the whole Roman empire into four prefectures, each prefecture subdivided into dioceses, and each diocese governed by an officer called a vicar. The diocese of Britain, in the closing days of the mighty Empire, was governed by a vicar of great ability and integrity, named Chrysanthus, who ruled over five British provinces, which were typified in his symbols of office by five castles enclosed within a line, that imitated the triangular form of the island. Alas, these five insubstantial castles, and his book of instructions in the official green cover, were all, or nearly all, that now remained to Chrysanthus of his former pomp and power: his occupation was gone; his soldiers had all been withdrawn to the defence of other Roman provinces against the barbarian hordes. His court had gradually melted away. He looked round for his officers—they had one by one fled from a country that to all human foresight appeared doomed to destruction—beset with savage robbers, and pirates by sea and by land. Secretaries,

accountants, notaries, clerks, sergeants, assistants, all had disappeared, taking with them their wives and families. When the last of his officers had fled, Chrysanthus cast his eyes over the land, and a melancholy scene presented itself: twenty-eight Roman cities abandoned by their Roman occupants and rulers; his own family the last, as it seemed, to quit the soil.

But the time had come for his departure also. The Saxons had possessed themselves of many miles of the south-eastern country lying by the sea-shore. They were at no great distance from the rich, beautiful, and strong city of Anderida, in which Chrysanthus had a villa fitted up with Roman taste and splendour. Here his family had generally preferred to reside; and here Chrysanthus lingered whilst making his last efforts for the defence of the island. Every way his skill and wisdom were baffled. Rome had long been too unsettled, and in too much danger from barbaric multitudes, to govern this remote province wisely, or to defend it with any steadiness; yet, until too late, the strict despotism of the Empire forbade the Britons, or Anglo-Romans united with them, to defend themselves. The unfortunate people made many attempts to shake off the fetters that hung so heavily on their hands, and fastened their weapons to the walls of their homesteads: they repeatedly attempted to establish a new British empire; but obstacles, troubles, and distractions, multiplied. Rival emperors divided the treasures of the British and Roman-British; every new tyrant in imperial purple, who could master Gaul, became a new despot for suffering Britain; and, regardless of that island's fearful situation—exposed to the ravages of Picts, Scots, and Saxons—commanded its British and Roman soldiers to quit their own land to fight for strangers. Thus the strength and the power of Britain melted away, and the Anglo-Romans saw but two alternatives,—to remain, and fall a sure prey to northern or Saxon pagans; or to depart, where the presence of Roman legions might promise them some security.

Chrysanthus was unable to stop the rushing torrent of retreat. Fear gave wings to the flight of the Anglo-Romans, while the unfortunate Britons beheld them depart with anguish and dread, mingled with inde-

finable astonishment; and walked the deserted streets of the late populous cities with streaming eyes and trembling limbs. Still the Britons of Anderida and the country round about hoped in Chrysanthus. He seemed like their guardian angel. Crowds surrounded his villa when the news burst upon them that Chrysanthus was about to leave them; that the ship, which was to bear him and his noble and amiable family far away, lay rocking by the beach. The lamentations of young and old reached his ear as he walked mournfully in the elegant court of his villa, adorned with fountains, statues, and flowers. He listened, covered his eyes, and then gathering his ample robe about his shoulders, moved rapidly to an inner apartment sumptuously furnished. Here his family were assembled, with a few domestics. The ladies were in tears. The only son of Chrysanthus stood in gloomy reverie apart from the rest of the group.

"Well, Felix," said his father, "the hour has come for bidding an eternal farewell to Britain. The poor people! What will become of them?"

"I shall take my stand amongst them, father, for I am resolved to stay, and defend the home, the life, and happiness of Vaida with my life-blood."

"It is then true that thy heart is given to the shepherd's daughter. I heard so, but hoped otherwise of thee. Be it as thou wilt."

Chrysanthus turned away with a look of settled displeasure and pain that pierced his son's heart.

"Father, what am I to do? Hear me."

"To what purpose? Your resolve is taken. There is no more to be said."

"Oh, my son!" said the wife of Chrysanthus, "do you renounce us? Do you forget our love for you. Can you sacrifice the dear friends of many years to a hasty and imprudent passion? Andromeda, speak to him."

Andromeda, a graceful and elegant young woman, clasped his hands, and looked beseechingly in his averted and frowning countenance.

"Sister—mother—I love Vaida. Can I renounce her—leave her to the Saxon?"

"What can you do for her?" said Chrysanthus. "Be rational. Have you soldiers

to defend the city? Of what avail will be your single arm?"

"I will gather the Britons, and will head them. There may yet be hope."

"Then why do I depart? Have I, or have I not, laboured in this cause with heart and mind? Have I left one thing undone that could be done? Point out to me in what direction lies the hope. I sit down patiently to listen. Now, son, you are silent."

"There are strongholds and soldiers yet left in the west."

"How can you avail yourself of them? All that are in the west are needed to guard the west."

"I will never surrender her," said the young man, doggedly. "Why may not she go with us? If she is poor, she is worthy, and these are times that level distinctions."

"Send for the shepherd," said Chrysanthus.

He came in his rude shepherd garb—a plain and simple man, with a honest countenance.

"My son," said Chrysanthus, "loves your daughter Vaida. He refuses to leave her. He wishes to wed her, and desires her to depart with us. What say you, my good friend?"

"I thank your son," said the shepherd, slowly, as he scanned from under his grey bushy eyebrows the faces of the Roman ladies present, and read little encouragement there. "I thank your son. But Vaida stays with her own family."

Felix made an impetuous movement, but his father checked him.

"Have you any plans for securing your safety—you are aware the Saxons are hovering near."

"My girl is good and obedient; she will enter the family of a chief who has a fortress on the western hills—there she will be safe."

"I rejoice to hear it is so," said Chrysanthus. "My son also will live to approve your determination. Felix is the hope of my house; we all need his services; we all require his counsel. We may yet have to rely on his strong arm, for we are going forth into no land of peace and security. Look, Felix, upon your mother and sisters, on my aged parents, and be resigned to this sad necessity. Come, come, my son, have fortitude—have patience; sor-

rowful hearts and broken ties are the portion now of many beside yourself."

Felix, the only son of Chrysanthus, had been carefully educated in Greek, Roman, and Celtic literature, and in all those practical sciences in which Rome so greatly excelled. Highly accomplished, energetic, ardent, and ambitious, but disappointed by the prevailing distractions in his hopes of honourable independence in Britain, in the service of the Imperial government, he had given up his heart and thoughts to love, whose best antidote, his father knew, lay in active service abroad. He, who had studied wisdom in the higher classics came to be content to sit for hours at a time on the green hill side, gazing on the blue eyes and modest countenance of a rustic maid;—he, whose tutor was one of the most learned bishops of the British church, forgot that his life was of any higher moment than to trifle on pretty phrases and simple songs; and he who had led his fearless troops against the barbarians with a success that was often talked of by British hearts, gave up, when not so employed, nights and days to visions of tenderness and fancy, better suited to Arcadian scenes and a golden age, than to the terrible days in which he lived. His chief duty, when his father's troops were all withdrawn, was to superintend the British guards in the watch-towers along the shore near Anderida; nor did he wilfully neglect this important trust, although his father found that not one of the least of the uses he made of it, was to gain time, unobserved, as he thought, for visiting Vaida.

The shepherd was an extremely taciturn, rather morose, but well-intentioned man; of earnest religious faith, and so untainted with Armenianism or Pelagianism (heresies secretly flourishing in Anderida), that he would hardly walk on the same side of the street with an Armenian or a Pelagian, if he knew it. The hourly alarms he suffered from rumours that the Saxons were coming to waste and destroy, led him to look around anxiously for the best means of securing Vaida's safety: for himself he was utterly fearless. Of her numerous admirers there were but two who had the least likelihood of being able to protect her. One was Felix; but the shepherd had too much sense, and too much British pride, to accept that golden bait. Her

simplicity, beauty, and virtue, would not have prevented her from being miserable in polished and highly educated Roman society. That was not her sphere;—he knew it. But as Vaida was devoted to Felix, he concealed from her, until the last moment, how he intended to dispose of her future life.

She—guileless, gentle, and pure as the sheep she tended—never asked herself if it were wise or unwise, right or wrong, for Felix to woo her: he was so perfect in her eyes, so exalted above common men, that how he could be blamed in anything was beyond her comprehension. But when she knew that Chrysanthus and his household were about to depart for ever, as other British Romans had departed, and when Coil, her father, told her shortly and sharply that the son's first duty was to his parents and to his family—that he was going with them—the tender girl withered as a flower withers before the freezing blast; but habitual reverence for her father, and piety to God, led her to suppress her anguish: she kneaded the bread as usual, baked the savoury cakes on the hearth, tended the frugal pot of vegetables for dinner, drew clear water for her father from the spring, stood in humble attendance whilst he ate and drank, and then, with her crook in her hand, went forth to watch her sheep—to work with distaff and spindle, and weep in patience. From the green and herby slopes on which she rested, there was a wide and picturesque prospect of the sea-coast, with its watch-towers and turrets, and she could see, passing from tower to tower, Chrysanthus and his son. She could not be mistaken as to their figures, accompanied by a British chief whom she had often seen with Felix. "It is Riothamus," she said, "who will be our only protector from the Saxons when *they* are gone." The Romans often stopped to speak earnestly to Riothamus, and to point out to him various parts of the defences: they were giving parting instructions and advice concerning them. As Vaida gazed, the elegant and stately figure of a British-Roman lady stooped beside her, and a hand pressed hers with kindly sympathy. It was the elder sister of Felix, the most liberal, charitable, and noble-minded lady of a family beloved for their goodness to all who needed their help or counsel. She had now sought Vaida, to

strengthen and comfort her. Much she said to her of sacrifice for duty, and of that peace which the world can never give nor take away—showing her that every true Christian must be a martyr. At parting she gave into her hands an ivory box. "Conceal these," said the lady, "where only yourself can find them, until, in Heaven's mercy, a quieter hour arrives. May God keep you in safety, and restore your peace."

"And you, dear lady," said Vaida, "have I not heard you are betrothed to the general, Riothamus, the noble chief who will command the city?"

A sudden paleness overspread the lady's face.

"His duty, Vaida, is to stay—mine to go. It is most likely that he and I will meet no more in this miserable and fleeting world. You see I preach to you what I practise." She stopped suddenly, for wild cries reached them; and from that elevation they could see numbers of the British people crowding with agitated movements the stately avenues that led within the city walls.

"Some new alarm!" exclaimed the lady; "Farewell, Vaida; peace be with you!"

All along by the winding rocky shores were gathered sorrowful and anxious people, waiting to see the departure of Chrysanthus, his family, and kindred. There were many wives and children, whose husbands and fathers, Roman soldiers, were absent in the service of the distressed empire, with little or no prospect of ever returning; for Roman soldiers in Britain had generally united themselves to British women: the countenances of many present showed intermixture of foreign blood, the Imperial government having been used to send Britain her troops from other provinces—Belgic, Gaulist, Spanish, &c.—and employ British soldiers far away from their native land—a policy which was very well for Rome, but fatal to Britain. There were British tenants of Roman landholders, who had received grants of British lands from the emperors. Now the landlords were gone or going—the lands would be the prize of those who could take and hold; but the poor tenants were quivering in fear and trouble. There were all, or nearly all, the privileged *Municeps* of the city—that is, all the citizens; and there were

the Decuriones—the corporate body, senate or council—with its two chief magistrates and other officers—all distinguished by Roman appellations, and all speaking the Roman language, and learned in Roman law, but all of British or half British race; and unfortunately, for the most part, men better fitted for Roman enjoyments and civic dignities than for the stern necessities of a defence against savage hordes. Riothamus, in full war costume, rode at their head, having assumed the chief government, for which he had peculiar advantages in his western connexions. Amongst the impregnable fastnesses of the west of Britain he still hoped to raise troops, and obtain chiefs fit to lead them. Let us observe, by the way, regarding the municipal institution, that the later Municipia of the empire resembled in all respects our modern corporate towns, of which they were the origin and type.

The crowds were divided into many groups, some were on the sands, some on the rocks, some were conversing in the Roman tongue, some in the British; and occasionally the ear might catch the two mingled languages—for both were freely spoken in Anderida—but Roman chiefly by the upper classes, of whatever race. The trade of Anderida was also represented on the beach; and, as people must eat and drink be they in what trouble they may, fishermen and women were offering fresh-caught fish, and boys were vending sweet cakes and fruits; little children also were playing about the sands, picking up mussels and periwinkles. One party of sturdy little boys had got by themselves, to draw in sand an imaginary battle between the Saxons and the British—so little cared they for the uncertain rumour which agitated their parents, that three ships full of Saxons had arrived at a few miles' distance, and made good their landing.

And now the last of the Anglo-Roman occupants of this island had passed away; the broad white sail of the strong and graceful ship was floating over the deep sea, farther and farther from the longing gaze of the deserted Britons. Vaida knelt on the sands, her face hidden in her hands. Near her stood Riothamus, now on foot, with a countenance of sad yet dignified and meditative regret, pondering what was to come.

Parting signals continued to be exchanged between the ship and the shore, until the former was far distant in the blue horizon. Then Coil, the shepherd, approached Vaida, and bade her arise and follow him. She obeyed in silence. He led the way to the residence of one of the old princely native families of southern Britain—now reduced to a few helpless individuals, who were on the point of taking flight westward. A small church was attached to the dwelling. In the building a few tapers gleamed over twilight aisles, furnished for simple, equal, free Christian worship. A priest stood at the altar. Coil took her hand in his; it was icy cold and damp. He drew her forward to the priest, who spoke kindly to her. A door opened, and there entered the chief servant of the princely family to whom the church belonged, attended by two friends. Vaida uttered a faint cry of dislike, fear, and anguish, when she beheld Isca—a lover whom she had often rejected.

"Child," said Coil, "I give thee to Isca. This priest will unite ye; then thou wilt set forth to the west with him, and the good household he serves. There thou wilt be secure."

Isca advanced, but Vaida pressed her hands to her heart, and suddenly fell on the pavement before the altar; and when Coil and Isca stooped to raise her, they could see plainly that her heart was broken, and life was gone. Efforts to revive her were unavailing. The dim lights of the altar revealed her lovely face and graceful form—rigid in death. She heard not the thrilling cries that presently resounded without—"The Saxon! The Saxon!"—nor the rush of flying footsteps. And during the savage scenes that followed those cries in the doomed city, Coil was alone in the church with his dead child.

It was the year 477, when the Saxon chief Ella, and his three sons, Cymen, Clencing, and Cissa, having landed with their followers on the coast of Sussex, destroyed every separate and disorderly band of Britons which threw themselves forward to oppose the advance of the invaders. Riothamus, however, quickly mustered within the city all the men of the district who were capable of bearing arms. Even the women he prepared to defend their houses. The siege of the city was long and severe, but not

doubtful. Shiploads of Saxons arrived hourly, all picked and valiant men. The defence was as desperate as the attack was determined. At length the fierce Ella and his sons shattered the walls and gates, and forced an entrance amidst showers of British arrows and stones. Every step they took in the streets had to be planted on dead bodies; every house resisted them, until no more men or women were left alive to resist. The slaughter was fearful. And the good city fell to rise no more. It was razed to the foundations by the savage victors, and even its site is now unknown. One of the last who perished was Coil, by the hand of Ella himself. The Saxon chief, grim and gory, entered the church with a short sword in his hand. At the sight of Coil, watching the dead girl, he stopped.

"Ha!" he cried, "what art thou?"

"A Christian Briton, who hates the Pagan Saxon!" said Coil, rising erect and defiant. One thrust with the sword, and he lay dead by the side of Vaida. M. B.

ELOCUTIONARY EXERCISE.

WHILE I draw sword,

And do the hideous courtesies of war,
My senses, quick with fate, learn all the scene,
And snuff, prescient, on the heavy air
The perfumed death. My foe, a Spartacus
In make and weapon, took with careless scorn
The languid challenge; and with his flat sword
Spurn'd me to action. So have I beheld,
At the unequal pleasure of the winds,
Some poplar giant—tyrant of the plain—
Fall foul of some slim cypress. Point to point,
And blade to blade, and hilt to hilt opposed,
The glittering mazes of the gleaming glaive
Coil and recoil. The waxing strife has shrunk
The earth to standing ground. The whole wrapt
being,

Sent hot into the hand, spares not one sense
Beyond the sword arm's circle. Into which,
Half-understood, the dreadful seas of clamour
Thunder their surges. So meseems a soul
Falling through mid space, hears the passing shout
Of unseen worlds. And now the giant, stung,
Casts off his sword craft. Striding like a storm,
Uproots me, lightning. See my blade fly up,
Like a flung torch; myself into the dust
Hurl'd like a spear; and the Goliath, folding
His untask'd arms upon his unbreathed breast,
Look up without a flush for the well-known
Signal of doom. Two hundred thousand hands
Gave it. He saw. While the sword rose and fell,
Up from the podium to the beetling height
I turn'd one dying look to the mute nation, [strain
Which—stretching neck and nerve with sanguine
To catch the bloody joy—through all its legions
Held such a stifled horrible expectance,
As if the greed of anguish could not spare

The groan a sigh might cover. Round the vast
O'er-peopled hell, the terrible haste of death
Took my mad eyes; and, in the indistinct
Wild glance, its serried thousands glared on me
Like one tremendous face.

Consenting sat

That day, all that the world most loved, fear'd,
worshipp'd— [proverbs

Sages whose household words, caught up, made
For far-off nations: grey proconsuls, warriors
Whose mere names stood for victory in all
The tongues of Europe; senators, whose title
Ennobled kings; priests of all orders, bishops
Whose heavenly treasure was not lent, as yet,
To earthly usury; great merchants, men
Who dealt in kingdoms; ruddy aruspex
And pale philosopher, who bent beneath
The keys of wisdom; artists, and whatever
In Rome claim'd to be poet; woman, too,
And passing fair—not that mine eye had note
Of any separate loveliness, or knew
More than a sense of exquisite relief,
A more or less in hate, an intuition
That in the living mountain which rose round,
All was not adamant; a milder mood
In a most terrible destiny. I saw it,
As when upon the fretful parapet
Of some vast cloud that doth engird the west,
Flush'd and distemper'd with the angry hues
Of passionate sunset, oft at eve there shineth
A line of purer light. All these sat there
Consenting, and with them the purple pride
To which all these bow'd down; and I must die.
Swept through the silence a great wind of voices,
"Look to the podium!" Breaking from the
ranks,

A Christian priest—I knew him by his habit—
Cleaves the gold fences—lion proof—with more
Than lion's heart; and, as the sword fell, stands
'Twixt me and slaughter. Abdiel, with such
gesture,

Held Satan off. The rude barbarian, scorning
The feeble game, flings down his sword. That
moment [heard I

Methought hell burst, and in a death-trance
The outcry of the damn'd. The observant host
Rose like the simultaneous tide, when hid
Volcanoes heave the ocean, and a long
Vast wave engulfs an island. Not the war
Even of those seas drowning the blasphemies
Of shrieking, sinking cities, storms the ear
Like what I heard. Tremendous rushing life
Yell'd round the place; and, as the howling vortex
Belch'd up its sounds, the screaming horrors struck
The impassive walls, and like caged fiends came
back

Convulsed with madness. Then the tempest turns
Inwards, and with one gust, as at a sign,
Guts the stone entrails of the awful tower
In whirlwind of revenge. Like an explosion
Down hails the hurricane fury. So Vesuvius,
With mountains wrench'd from her own bowels,
piles,
Shoaling the blasted plain.

Slain, slain, and buried

By the same act under one terrible heap
Lay martyr, victor, vanquish'd. Last to die,
I felt the growing weight, and heard through all
The exulting thousands. How the sounds dash'd
down

Like stamping furies! Here the vision ends:
With the death-pang I woke. *The Roman.*

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

I. *The Preliminary Education of the future Medical Student. (A Letter from an Old Medical Practitioner to a Schoolboy.)*

At last, then, the important question is decided, and you are destined to be a surgeon. Your choice has my hearty approval. Loving the noble profession to which I belong, I am glad to see its ranks recruited by those who give promise that they will do honour to it, and to themselves in it, by talent wisely directed; by zeal, integrity, good feeling, and good manners. Men are apt, I know, to judge with too partial fondness the pursuits to which their own best energies are devoted; therefore, when I speak in praise of the medical profession, I will shun the temptation to injustice that proverbially lurks in the comparative degree. I will not measure its claims to respect against those which may be preferred in favour of other callings less intimately known to me, lest I fall into the same kind of absurdity as the French dancing-master, who set his own art above the loftiest efforts of the human intellect. "*La philosophie est une belle chose—mais la danse!*" Philosophy, he owned, was a fine thing in its way; but dancing! ah, that transcended everything! Well, we need not adopt that style of eulogy with regard to medicine. Enough for us to know, that in its study, as well as in its application, in the wide range of science it embraces, in the constant interrogation of nature it commands, in the infinitely various forms of truth it unfolds, and in the power it confers of assuaging human suffering, of speeding the progress of civilization, and promoting the health, well-being, and well-doing of individuals, families, and peoples, it gives endless scope for ennobling and delightful exercise of almost every faculty of the mind and heart of man.

You see, that without coming quite up to the level of the Frenchman's overweening pretensions, I yet pitch the standard of excellence in our profession at a very imposing height. I trust you will do so, too, and that your efforts will be strenuous and unceasing to realize that lofty ideal. Never lower the majesty of duty at the

suggestions of sloth and self-indulgence. Aim always at the highest things, if you would win the respect of those around you; and what is better still, the approval of your own conscience. If, on the contrary, you are habitually content with doing barely enough, be assured you will often fall short even of that ignoble mark. "Oh, that will do well enough!" is the maxim of groveling mediocrity; never was it heard from the lips of those men who have deserved well of their kind. All the great and good things that have been done for mankind have been done by men whose looks were ever onward and upward to larger and grander achievements, not resting for a moment in indolent complacency on the work they had already accomplished. When Newton, who may almost be said to have created that Natural Philosophy which is the very breath and life of modern civilization (for he found it a chaos, and he brought into it light and fruitful order)—when Newton was on his death-bed, what were the terms in which he spoke of his own inestimable efforts and discoveries? "Alas," he said, "I have been but as a child, playing on the shore of the great ocean of truth, and picking up here and there a shell or a shining pebble!" In those solemn words we recognise not only the humility of genius and of knowledge the vastest and most profound, but also the spirit that animated the great explorer of Nature's mysteries, and that prompted, sustained, and fructified his immortal labours—the spirit of endeavour, as infinite as the truth it strove after. In the same spirit, with powers however feeblar, must every man apply himself (or better not apply himself at all) to the task of communing with nature, and interpreting her laws to his fellow-men.

Possibly you may object that this has no bearing on your case, because it is not intended that you should enter upon the highest walks of the profession. A general practitioner, such as you are to be, can have little leisure, you think, for searching out recondite truths, and must be content to take his science at second-hand. Such a man, it seems to you, will best fulfil his duty by availing himself, to the utmost of his ability, of the practical knowledge of his day, and applying the resources of his art for the relief of his patients, without

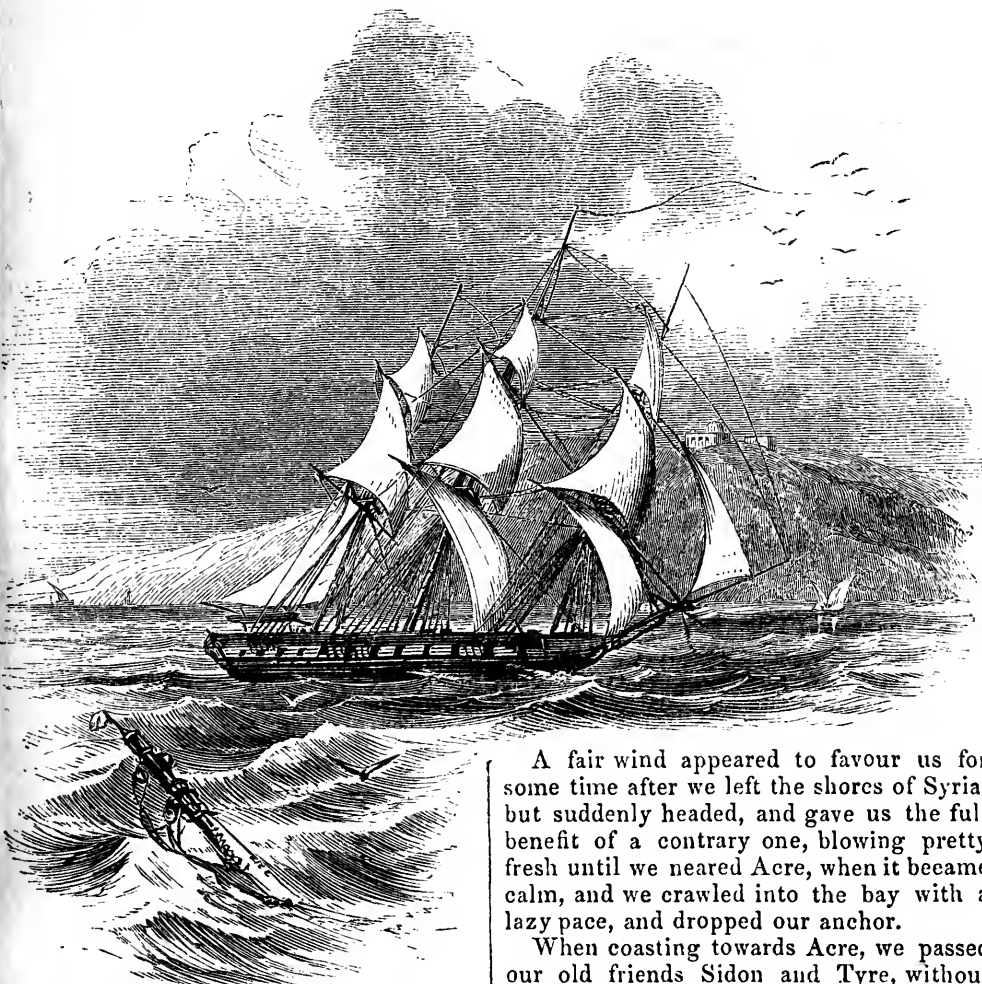
suffering his mind to wander, and his time to be wasted, in inquiries foreign to his immediate business, and which he is less likely than many others to prosecute with success. This objection seems plausible; but there is a fallacy at the bottom of it. In the first place, you must remember, that the common classification of the profession into physicians, operating and consulting surgeons, and general practitioners, is, in a great degree, if not altogether, arbitrary and conventional. Disease and death know nothing of such distinctions, and will not abate their violence in deference to them. The general practitioner has, therefore, as much need of the whole arsenal of medical knowledge, as his brethren of other denominations. Nor can it be tolerated that he should practice medicine as if it were a mechanical art, in servile dependence on rules and precedents. There would be less harm in this if diseases were constant and definite in their character, instead of being, as for the most part they are, among the most variable of all natural phenomena, so that to deal with them successfully one must always be prepared to modify general rules in accordance with the special conditions of each several case. Think, then, what botch-work your general practitioner must make of it, who, having passed through his student time under the soul-stunting influence of a low estimate of his duties, continues through all his life after, a mere plodder in the ways of routine! There are other functions, too, besides attending on the sick, which the medical man of every grade is often required to discharge; such as giving professional evidence in questions of civil and criminal jurisprudence, that not unfrequently involve the most subtle refinements of science. Finely routine would help him here!

It is plain, then, that every medical man, whatever be his status in the profession, is bound to make himself thoroughly master of all the knowledge—practical and theoretical—that bears upon his calling. But knowledge, and the capacity to apply it, by no means constitute the sum total of his requisite endowments. Foremost among these, I place his moral characteristics. The good doctor must be emphatically a good man. Of him, especially, it is required that he shall always do his

best, and no man does this whose heart is not in his work. He must minister to the minds as well as to the bodies of his patients, and soothe and cheer them in their hours of querulous weakness and despondency; and how can he do this if his heart be void of warm sympathy with human suffering? His position marks him out as one to be consulted by families as their trusted friend and adviser; his integrity, his firm and temperate character, his candour and discretion should justify the confidence they repose in him. He must be a gentleman in the highest sense of the word, with manners and deportment outwardly reflecting his inward worth, a polish not borrowed from the varnish of fashion, which a little friction will rub off, but inherent, like that which attests the fine temper of the steel. And *his* temper, too, will be put to many a severe proof. A more irksome position there can hardly be than that of a selfish man in extensive practice, with a large proportion of poor patients on his list. Such a man has mistaken his proper calling. He should have chosen any other profession than one which demands so many gratuitous sacrifices of ease and comfort.

It is fortunate that you have chosen your profession thus early in life; so that you will have time, before you enter upon the technical part of your education, to shape your habits and studies in accordance with your future career. The want of such previous training is an evil much complained of by medical professors, as affecting a large proportion of students. *Ex quovis ligno, non fit Mercurius*. A silk purse is not to be made out of a sow's ear, nor an accomplished medical man out of an illiterate, weedy-witted youth. In my next letter, I will talk to you, among other things, of the manner in which you may turn to the best account opportunities which, if now neglected, can hardly be recalled hereafter.

"If you ask me," says Zimmerman, "which is the real hereditary sin of human nature, do you imagine I shall answer, Pride, or luxury, or ambition, or egotism?" No; I shall say Indolence. Who conquers indolence will conquer all the rest. Indeed, all good principles must stagnate without mental activity."



EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE THIRTEENTH.

ACRE, ITS HISTORY AND VICISSITUDES—THE
STREETS, THE CONSULATE—RUINS OF THE
ANCIENT CITY AND PUBLIC BUILDINGS—
MODE OF FORMING HOUSE-TOPS—CAIPHA—
MOUNT CARMEL—ARRIVAL AT JAFFA.

"Her giant-form

O'er wrathful surge, through blackening storm,
Majestically calm, would go
'Mid the deep darkness, white as snow;
But gently now the small waves glide,
Like playful lambs o'er a mountain's side."

WILSON.

Two days after our departure from Bey-
rout we were riding at anchor, snug enough,
in the Bay of Acre.

A fair wind appeared to favour us for
some time after we left the shores of Syria,
but suddenly headed, and gave us the full
benefit of a contrary one, blowing pretty
fresh until we neared Acre, when it became
calm, and we crawled into the bay with a
lazy pace, and dropped our anchor.

When coasting towards Acre, we passed
our old friends Sidon and Tyre, without
knowing it, and it was not until we had
rounded Cape Blanco and were off the
Ladder of Tyrus, or the *Scala Tyriarum*,
that I recognised the old pass on the route
to Acre, from which I had so often gazed
at the surrounding wild and varied scenery,
and listened to the music of the billows.

Acre, or more properly Akka, is the
Accho of the Scriptures (Judges i. 31),
and also the ancient Ptolemais, where Paul
remained one day on his return from Jeru-
salem. It is said to derive its double name
from the circumstance, that it was founded
by Acon and Ptolemais—twin brothers; but
some have contended that the name of
Ptolemais was given to Accho, as a com-
pliment to Ptolemy the First, who enlarged
and beautified it. Its oldest name is

probably Accho, which was changed to that of Ptolemais during the Greek government of Syria, and the old name of Accho restored, after it fell into the hands of the Saracens.

It was taken from the Christians by the Saracens, in 636, who retained possession of it until 1024, when Baldwin, King of Jerusalem, assisted by a fleet of seventy Genoese vessels, attacked and took possession of it, after a siege of twenty days by land and sea. In 1187, Salah-ed-din made himself master of it, but it was retaken in 1191, after a siege of three years, by Richard Cœur-de-Lion, and Philip Augustus of France; and during the Crusades was formed into a bishopric. Subsequently it was in the possession of the knights of Malta, who built a great many churches, and strengthened the fortifications.

In 1281 the Saracens besieged it with an army of 160,000 infantry, and 60,000 cavalry, and it appears doubtful whether they would have taken the city, if it had not been for internal dissensions. There were the representatives of England and France; the Kings of Naples and Cyprus; the Knights of Malta; the Count of Tripoli; the Prince of Antioch; the apostolic Legate; the Genoese, Armenians, Florentines, Pisans and Tartars, all contending who should reign supreme: but while disputing for its government, the city fell about their ears into a heap of ruins. The ruins were cleared away, and a large bazaar for merchandize erected, where the palace of the Grand Master of the Knights of St. John (from whom it took its name of St. Jean d'Acre) once stood. The fortifications were repaired and strengthened, and Acre once more bid defiance to the Eastern world, and for a long period was undisturbed. In 1517, it was besieged and taken by a large Turkish force, after an obstinate resistance. Under the Turks it fell rapidly into decay, so that in 1610 there were not more than between 200 and 300 inhabitants. In the middle of the eighteenth century, Sheik Daher rebuilt many parts of the town and fortifications, and re-established the commercial importance of the city. Djezzar Pasha, who was, without doubt, the most execrable tyrant that ever governed in Syria or Palestine, repaired and deepened the harbour, rebuilt and strengthened the fortifications, built a

new mosque, and made it the seat of his government.

In the spring of 1799, Bonaparte entered Syria at the head of 12,500 men, and attacked Acre, but the garrison under the command of Djezzar Pasha, aided by Sir Sidney Smith and the British sailors, offered such a determined resistance, that Napoleon was obliged to raise the siege, and retreat to Egypt, after losing nearly 3,000 men, in about sixty days, and failing in his twelfth assault. The city and fortifications, which had sustained considerable damage during the attacks, were repaired, and Acre was again rendered a stronghold. Ibrahim Pasha having encamped the Egyptian forces on the plain, near to the gate of Mount Carmel, besieged the city for six months, and although the Turks made an obstinate resistance, yet the shot and shells of the besiegers were so well directed and effectual in their work, that the city was almost reduced to a heap of ruins, and the victorious Ibrahim entered it on the 2nd July, 1832. He repaired and strengthened the fortifications, and improved the city, which did not long enjoy undisturbed tranquillity; for in 1840, it was besieged by the combined forces of England, Austria, and Turkey, during the operations carried on for the purpose of restoring Syria to the Porte. On the 3rd November, 1840, it was bombarded for several hours; the *Castor* and *Benbow*, and other ships, blazing away with all their might; and, aided by the steamers stationed more out to sea, did their work well. A little after four o'clock in the afternoon, the east end of the fortress was observed to be in a blaze of light for a moment, and then a dark, dense cloud arose, and above it, masses of masonry, shells, stones, and dead bodies were hurled on high—the magazine had exploded! A few minutes more and the din and strife of war had ceased, the smoke had been wafted over the ruined city, and the besiegers were in possession. What a sad spectacle presented itself to them! The ground around where the explosion took place was strewn with the bodies of human beings, writhing in the agonies of death, or lying, mere blackened masses, amid the ruins of the magazine, mingled with the bodies of cows, horses, camels, and donkeys. It is said that 1,700 men perished by the explosion alone.

The town now contains only a mere trace of its former splendour, and its population has dwindled from 20,000 to scarcely 8,000. The streets are strewn with huge blocks of stone, prostrate columns, pieces of shell, grape shot, and even large beams, evidences of the havoc of war, which the indolent inhabitants have not taken the trouble to remove. The streets are worse than some of our wretched lanes in England, abounding with filth, narrow, and irregular. The shops are miserable affairs, only eclipsed by the goods exposed for sale, and the dirty shopkeepers themselves. Here the fragments of a British flag waves triumphant from a shattered flag-staff and a miserable dirty house, called the Consulate. It was a humbling sight to me, when passing beneath the portals of our Sovereign's representative, I saw his wife employed in the lowest menial occupation, his daughters washing clothes, and himself—but we must not betray the rites of *imaginary* hospitality. The worst of all was to see a tattered Union Jack, fluttering in shreds from the dilapidated flag-staff. It is quite time that England paid proper persons sufficiently well to maintain her dignity in foreign lands, when we see such sights as these at almost every town along the shores of the Mediterranean. Damascus, which is inland, and seldom reached by naval people, at least, has one of the most excellent of persons for a consul, but is, I fear, not paid equal to his merits.

Among the remains of the ancient edifices of Acre, there is a very large oblong building, said to be of the time of the Crusaders, but the statement is not well founded. One thing, however, is pretty certain, that it was intended as a stronghold in that age, when Acre was attacked alike within and without her walls, by foreign feuds and besiegers; for there are the remains of its portcullis, and its massive walls with double gateways.

Passing along some narrow streets, we arrived at the ruins of the church of St. John, the tutelar saint of the place in the time of the Knights Templar; then proceeding a short distance, we saw the beautiful mosque built by Djezzar Pasha, which was almost destroyed by the siege of 1840, its dome exhibiting undoubted proofs of the gunnery of our ships, and looking beautiful even in its ruined state,

surrounded by the dark cypresses. Near to the outside of the gate is a very fine fountain, protected by a bronze grating, which remains almost uninjured by the ravages of war.

The houses of Acre are more like model castles than ordinary Syrian houses—they are so massive and well built: the roofs are all flat, being constructed in the following manner:—The beams which form the ceiling of the uppermost story have nicely fitted deal planks laid over them, and then rafters, which are placed in an opposite direction. The spaces between the rafters are filled up with chopped straw, mixed with lime and shingle, and pounded charcoal being placed over this, a layer of lime and sand, mixed with ashes and charcoal, is laid upon the top, rolled level, and beat smooth with a piece of wood until it is hard and rendered impermeable to rain. In former days the compost was not used as extensively as it is now, but earth was laid upon the house-top, and rolled with a large stone roller that always remained there for the purpose—a practice that exists even in the present day in many parts of Palestine and Syria, which will readily explain the passage of the Psalmist, where he says, "Let them be as the grass upon the house-tops, which withereth afore it groweth up."*

The citadel, which had sustained considerable damage in the late war, was undergoing extensive repairs at the period of my visit. The view from the top was very fine, comprising the town, bay, and surrounding country. On the land side, to the north and east, it is surrounded by an extensive plain; on the west, the walls appear to rest upon a reef of rocks washed by the Mediterranean; and on the south is the magnificent bay, which extends from the city to Mount Carmel.

The port can only accommodate such a class of vessels as brigs, and those of less tonnage, because it is only $2\frac{3}{4}$ fathoms in many parts, and the reefs extend for some distance; but as the general rule, we may state, that the soundings are very good beyond 400 yards of the walls, although the anchorage is very bad, and the coast dangerous.

We had rambled over the greater part of the town, and therefore were not surprised

* Psalm cxxix. 6.

to find ourselves somewhat inclined to trust to other legs than our own for conveying us to Caipha and Mount Carmel. Accordingly, we selected the finest donkeys that Acre could afford, and amidst the almost deafening shouts of a crowd of dirty small boys, and idle Turkish soldiers, that had gathered around the abode of the donkey-keeper, we sallied forth, and, considering all things, cut a very respectable figure.

At first, the road lay along the margin of the sea; then we had to keep more upon the dry sands, and if an hour and a half's ride over a sandy beach in a hot, broiling day, with the mercury at 97° Fahrenheit, is considered a pleasant thing by any one of my readers, why then we had a delightful ride—to say nothing of the kicking propensities of two of the donkeys, which thereby endangered the limbs of some of our party.

There is one peculiar feature in the ride along the sands from Acre—the whole beach is strewn with portions of the wrecks of vessels; and frequently as we approached the remains of a vessel half buried in the sands, the scared sea-birds left the dilapidated prow, and screeching, flew to another. It was on this shore that the *Zebra* was driven, in December 1840, and as the monks of the convent at Mount Carmel had removed all the copper they could from her wreck, we had orders to proceed to Caipha to receive it on board.

Caipha, Kiaffa, or Caypha, is situated upon the water's edge, on the north-western shore of Mount Carmel, and is supposed to derive its name from the rocky ground upon which it is built.

It is said also to have had the name of Porphureon, from the purple fish found upon the coast, from which the famous Tyrian dye was made. Whether it was a place of importance or not, I am unable to learn; at present it has but a sorry appearance, consisting chiefly of one long street, with the governor's house at the end. It is surrounded by a wall, broken and crumbling away in many parts; and the houses, which in number are about a thousand, are mean and dirty. The population is variously estimated, but an old monk told me that he supposed there were about 3,000 inhabitants, the half of which number consisted of Turks, and the remainder of Greek Catholics. It was formerly a

bishopric; and a well-built church, now rapidly falling into decay, induces me to believe that it was once a place of importance, more particularly as there are the ruins of a castle upon the beach, and two forts, built as a defence against the corsairs that frequented this coast in the 16th and 17th centuries.

Towards the south-east corner of the bay is a respectable stream, that obliged us to consider whether it was possible to get over the other side dry or not. On these occasions we never consider the horses—only the baggage and ourselves. As good luck would have it, the river was fordable, and we passed over comfortably; but were informed afterwards, that it is only at certain seasons that the Makattam can be crossed. This stream is the one rendered memorable by the destruction of the host of Sisera,* being the ancient Kishon, immortalized in the song of Deborah and Barak, and takes its source in the hills of the plain of Esdraelon. It is mentioned many times in Holy Writ, and particularly when Elijah said to the people, "Take the prophets of Baal: let not one of them escape. And they took them: and Elijah brought them down to the brook Kishon, and slew them there."†

From the quotations referred to, it appears at one time to have been called "the river Kishon," and at another, "the brook Kishon:" this apparent discrepancy may be accounted for, by recollecting that at certain seasons it becomes swollen by the rains, sweeping all before it, as in the case of the host of Sisera; while at others, it is reduced to a fordable state.

Mount Carmel reared its head behind the town of Caipha, to the height of 1,200 feet, and its steep and rugged sides were clothed with scanty but fragrant herbage.

As this mount possessed more than ordinary interest, we procured a couple of guides, and commenced the ascent by a rough and circuitous path. The mountain's side afforded us but a faint idea of the land we were entering—one whose sky "is as brass, and its land as iron;" where brushwood supplants the golden-eared corn, and rocks take the place of verdant plats. At a short distance from its base is a small Turkish oratory, covering a grotto, and the

* Judges v. 21.

† 1 Kings xviii. 40.

monks take great pains to impress upon travellers' minds that it was once occupied by the prophet Elias. This cave is 18 feet long, 11 feet broad, and 18 feet high, very dirty, and pervaded by a most disagreeable odour. The monks of Carmel, or as they are generally called, Carmelite Friars, are very anxious about the state of each visitor's finances; and the barometric state of their instruction is in accordance. If you bestow a liberal present, it is rewarded by a description of the place where Elijah instructed the sons of the prophets—the place of sacrifice—the fountain that supplied him with water, and the spot where the priests of Baal were slain; if, however, your generosity is at a low ebb, their knowledge is scanty in the extreme. A little more toil up the sides of the mountain introduced us to the monastery of the Carmelites, in which the order was first instituted. It was pillaged and destroyed by the Arabs after the retreat of the French army from the siege of Acre, but has since been rebuilt by one of their order, and the interior furnished with excellent bedsteads, dressing-tables, &c., so that a stranger is at once rendered comfortable. There could not be a finer situation for a monastery on this coast than Mount Carmel—the air is so pure, the view beautiful, and the associations interesting and highly appropriate. With such advantages we cannot be surprised that the monks should have selected the spot.

It was upon the summit of Mount Carmel that the prophet Elijah stood, when he prayed for rain, and beheld a cloud arise out of the sea, "like unto a man's hand," in answer to his prayer. The Arabs affirm that before a storm or bad weather sets in, a cloud in the form of a man's hand is always to be seen. "The excellency of Carmel" is no longer heard of; the vineyards and olive plantations, which formerly clothed its sides, are supplanted by a few stunted shrubs and its aspect is such, that you do not feel you are standing on the spot "Where Carmel's flowery top perfumes the skies."

Descending from the monastery to the town of Caïpha, we jumped into a boat, and were soon on board our ship, which had anchored in the bay during our absence.

That evening we weighed anchor, and being favoured by a fine breeze, soon rounded the point of Carmel, and dashed

proudly on, spurning each tiny wave, and leaving a hissing channel behind us as we stood on our course. Onward swept the noble ship o'er the rolling deep, bearing us further away. Still leaped the billows, still foamed the angry waves, that were tossed around us, and onward went the gallant ship before the wind. The sun had gilded the feathery clouds that adorned the open sky, the wavering shadows from the buoyant vessel danced o'er the restless waters; the sea was dashing with fury against the black rocks, and the mantle of night was cast over Nature as we entered the port of Jaffa.



THE SMALL CHANGE OF CON- VERSATION.

It is told of Addison, that while in office, and having a seat in Parliament, he was called on to speak at a moment's notice, upon some subject then under debate in the House of Commons, and on which he, in virtue of his place, was the proper person to give an explanation. He attempted, however, in vain, to express himself fluently, or with perspicuity, and after stammering out a few incoherent sentences, he sat down under the greatest mortification. When rallied upon it afterwards, he is reported to have said, that though it was true, indeed, that he had not always at hand a supply of small change, his banker never failed him; meaning, of course, that however imperfect he might be in the habit of arranging his thoughts and finding suitable expressions on immediate occasions, he was always able to do both in an effectual manner when time was afforded him for deliberation and reflection. Addison was at this time, perhaps, too old to acquire the habit in which he acknowledged his deficiency; but such a habit is of the utmost importance to our success in life; for the "small change," to use Addison's most appropriate figure, provided we have enough of it, will serve all our occasions, both great and small, while the "banker" is sometimes of no use to us at all. This anecdote may fitly preface some remarks, in which I wish to call attention to a few of the things most commonly overlooked in school educations. In the first place, I would say that biogra-

phy, except of the eminent literary characters of classic times, is little known; and young men are often at a loss to understand and appreciate allusions to the prominent persons of modern history; young men who can relate every remarkable passage in the life of Achilles, Epaminondas, Cæsar, Philip, Demosthenes, Cicero, Cato, Brutus, and many other distinguished persons of antiquity, know comparatively little of Wolfe, Rodney, Nelson, Chatham, Burke, Paine, Fox, or Pitt. The records of the times just passed have not yet become history, and the events are yet too many and too crowded to be easily read and collected. There are many matters of business, too, which a young man on entering life is presumed to know, although nobody has been at the pains to teach him; as, for example, the modes in which rents and dividends are paid; what is meant by funded property, and national debts—British as well as foreign; what are the principles of insurances; the ordinary values of services of different kinds; and the obligations both of servants and employers. There are persons who make it their business, and take a delight in it, to know something of the history of every noble family in the kingdom. Too much time spent on such matters is not to be commended; but even of this species of knowledge a young man can hardly be quite destitute, without feeling himself occasionally in a state of inferiority to those with whom he is associating. In few instances have the distinctions of rank and fortune been acquired in our country but by deeds which, for good or evil, deserve to be remembered, and are intimately interwoven in the history of our country. The origin of the Beauforts, Howards, Marlboroughs, Russells, and Wellesleys, ought to be known to us all, and with respect to the principal families among the highest of the nobility, our knowledge ought to be brought down pretty fully to the time in which we are speaking.

Of the eminent men of other countries, we may be excused for knowing less than of those of our own; but still we should know enough to protect us from gross blunders. Do you recollect the droll anachronism which the French magistrate committed in the case of Yorick travelling in France, in the year 1750, or thereabouts,

as told in the *Sentimental Journey*? Yorick introduces himself to the magistrate through the means of a volume of Shakspeare; and to save himself the awkwardness of saying, "I am an Englishman, and my name is Yorick," he says, "Here is my countryman Shakspeare; he shall introduce me; for, lo! (turning to a part of the tragedy of Hamlet) here I find myself mentioned by him." This was an odd, quaint, and rather silly way of avoiding a plain statement; but the Frenchman, in his ignorance of England and of the English persons and the times when they lived, took it all literally; and, staring at Mr. Yorick, asked him in genuine simplicity if he were really Yorick, the king's jester. The Frenchman ought to have known better, and not to have been misled by Mr. Yorick's quaint proceeding.

To bring these remarks to some point, I shall conclude with the advice that I gave in the outset, namely, to look well about and pick up facts; ask questions, and make observations for a year or two, at least, before you venture too far into conversation, that you may not commit yourself for want of being as well supplied with *common* knowledge as with that deeper kind which is taught you at school. S. H.

THERE can be no doubt that before long something must and will be done on an extended scale for the education of the people. The resources of private benevolence are confessedly inadequate to the task of bringing the schoolmaster to every man's door. In large towns, a great deal has undoubtedly been effected by enterprising and benevolent individuals; but in villages and thinly scattered districts, comparatively little has been, or can be done. The difficulty of raising a sufficient sum to afford a decent maintenance for a respectable schoolmaster, is, in these situations, generally too great to be overcome without some compromise of principle. As a natural result, persons are frequently appointed to the office, whose only qualification is to be found in their deriving emolument from some other occupation, by the aid of which they maintain themselves, and keep open the school doors. It is in cases like these that the aid of Government is indispensably necessary.

THE TUTOR AND HIS PUPILS

[APPENDIX.]

Editor's Address:—London, 69, Fleet Street. The Editor of "The Family Tutor."

1—*Quotation, French.* H. H.—"La beauté sans vertue est une fleur sans perfume." Literally, "Beauty without virtue is a flower without perfume."

2—*Capers.* R. W.—True capers are the flower-buds, not the seeds, of the *Capparis spinosa*, which grows plentifully in the south of Europe. The unripe seed-vessels of the *Nasturtium* are frequently used as a substitute for capers.

3—*Seaward's Narrative.* J. L. R. & R. T.—Our correspondents have fallen into the common error of supposing that this work is a true narrative of events. It was written with the intention of conveying to the reader some curious information of a geographical nature; but the tale is a fiction, by the authoress of *Thaddeus of Warsaw*, *The Scottish Chiefs*, *Pastor's Fireside*, &c. viz., Miss Jane Porter.

4—*Butler's Analogy*, &c. C. A. R.—The *Analogy of Religion* should be read by every Englishman who wishes to comprehend the logical capabilities of his own language. Apart from the doctrines which it contains, it should be studied as a mental exercise. As a piece of mental gymnastics, it should fraternise with the metaphysical works of Schiller, Kant, and Hegel. With great propriety, its study has been made a part of the education of the student in King's College, London. We have never heard of any person who confounded (as C. A. R. states some persons have done) the author of the *Analogy* with the writer of *Hudibras*. The former was Joseph Butler, Bishop of Bristol, born in 1692; the latter, Samuel Butler, born 80 years before: the former has been considered one of our best theological essayists; the latter, the most witty writer in our language.

5—*Burette.* H. C.—The instrument which our correspondent describes was invented by M. Gay-Lussac, for the purpose of dividing a given portion of liquid into 100 or 1000 equal parts. It consists of a large tube, graduated into 100 equal parts, numbered from below downwards, and of a small tube, connected with the former at the base, and recurved at the top. The instrument is now rarely used in ordinary operations, but possesses a superiority over other measures, owing to the decimal arrangement of the divisions, and the great rapidity and precision with which any required portion of a liquid may be added or abstracted, while one hand only is employed, the other being left at liberty to use the stirring-rod or test-paper. It is a very useful instrument in manufactories where the value of numerous samples of acids, alkalies, bleaching powder, &c., has to be quickly and correctly ascertained.

6—*School Exercises.* L. E.—Our correspondent, who is a "married schoolmaster," writes to us to state, that he is almost wholly employed in arithmetical tuition, and that he would be glad to receive suggestions, to render his task of "class-teaching less tedious, and, if possible, less laborious."

We believe we shall render L. E. good service by directing him to obtain *Stanbury's Arithmetical Class Tablets*, which will relieve him of much labour, and facilitate the progress of the class. They may be purchased, we believe, with key, for five shillings. They are published by Madden, Leadenhall Street. They consist of cards containing sums capable of variation; and the cards being delivered to the class, a particular calculation, indicated by a number, is called for by the teacher, whose card contains all the answers (though they are very numerous). The pupil who first brings up his slate with the correct answer, is allowed to stand first in the class, while the less apt are assisted by the teacher, as he may think proper. The tablets include exercises in Addition, Subtraction, Multiplication, Division, and Reduction.

7—*Rotation of the Earth—Foucault's Experiment.* W. K., writing on this subject, has overlooked, or does not understand, our previous remarks in the Appendix of the first Volume. (No. xii. par. 265). It is admitted of course by all, that the point of suspension of the pendulum and the pendulum's substance, always bear the same relation to the earth, and move with it; but the abstract idea of the *line of motion* of the pendulum can be conceived apart from the point of suspension, or the substance of the pendulum. The direction of this line remains the same with reference to two fixed points in space, while the point of suspension and the substance of the pendulum are carried round with the earth's rotation; but the plane of oscillation being constant, and the position of the tables and surrounding objects being variable with the earth's rotation, it will be manifest that a line described upon the table, and indicating the position of that object with reference to the plane of oscillation in the first moment of the experiment, will not be parallel to the plane of oscillation in the next moment, because the table has moved with the earth's rotation.

8—*Candlemas.* L. L.—The name is derived, like Christmas, Michaelmas, &c., from the feasts of the Church. Candlemas was the popular name for the Feast of the Purification of the Virgin Mary, February 2nd, and arose from the lights which were then distributed and carried about in procession. These lights, it appears, were used in allusion more immediately to the words in the song of Simeon—"A light to lighten the Gentiles." It is highly probable that the use of lights was in the first instance an exchange for the torches which were used in the pagan lustrations, since the early church incorporated as many of such usages as possible, to prevent the ceremonials of the idolators being more imposing than their own. In the Roman Catholic Church the candles used on the occasion of the religious festival are sprinkled with holy water, and then given to the congrega-

tion. Formerly, they were kept, as having a peculiar power of frightening away devils, and were believed to be a preventive of the destructive effects of thunder and lightning. In some parts of the north of England Candlemas-day is called the Wives' Feast-day, because it has been a custom for the wives, who were "troubled with much serving" during the revelries of Christmas, to have the "return compliment" paid to them at this date. [See Brand's *Popular Antiquities*, and Sir T. Browne's *Vulgar Errors*.]

9—Rainbows, Halos, &c. G. P.—Our correspondent inquires the causes of lunar and solar rainbows, and halos, and wishes to be informed of the differences. It is quite impossible to write a complete answer to this question here, as the subject is very extensive, and would require illustrations to make it intelligible in all its details. Halos are luminous circles or rings, surrounding the sun or moon. Those around the sun are not so highly coloured as rainbows; while those which encircle the moon are comparatively colourless. The most probable cause of halos is that assigned by Mariotte, who supposes the refraction to arise from the refraction of light passing through small prismatic crystals of ice floating in the higher regions of the atmosphere. The appearance of a halo, therefore, indicates (according to this theory) a freezing temperature in the higher currents of air. This theory, however, will not explain the cause of the small halos called *coronæ*, whose formation is ascribed to the deflection of light in passing by the small watery globules suspended in the atmosphere. Hence, a halo close to the moon portends rain, (see the *Cabinet Cyclopædia*, Art. *Optics*.) Rainbows are opposite to the sun, and when perfect, present two concentric arches, one inner and primary, the other outer and secondary. The phenomenon is caused by the refraction (not deflection) of the sun's light impinging on drops of falling rain. Its nature was not understood until Newton discovered that solar light was compound, though Descartes had solved the other parts of the problem except that which related to the colours.

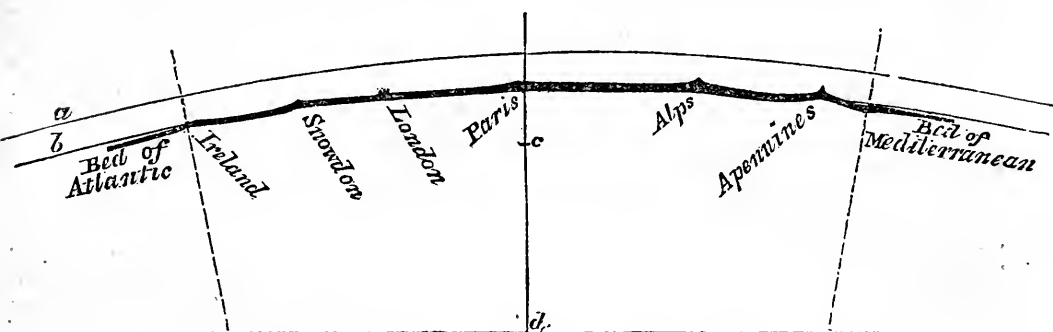
10—Building Societies. W. C., A. W. R.—As a monetary speculation, an investment in building societies is usually a prudent one: but the success of such associations is dependent upon management and local circumstances. A disadvantage attendant upon the deposit of funds in them, consists in the fact, that the shares are at a discount after the first few months from the commencement, and that, consequently, those who invest their savings in this manner cannot obtain the whole of them back till the period during which the society runs is nearly "run out." We refer our readers to Mr. Scratchley's clever pamphlet on these societies, in which are exposed some of the fallacies usually entertained in favour of them. One evident disadvantage of building societies, as investments for the industrious, is that, should death occur to the shareholder between the purchase of his share and the final completion of the payment due upon it, his representatives cannot usually regain even the amounts deposited; and in some cases the shares become forfeited altogether, because a purchaser for the shares of the deceased member cannot be found, and the widow is unable to continue the necessary payments. Some of these objections have been met by the application of principles we have before

mentioned. We have before us the copies of the rules of a freehold land and building society, in which steps have been taken to remedy the imperfection. We would also refer to a paper published recently on *Industrial Investments and Associations*, by Messrs. Chambers; and to a pamphlet entitled, *Periodical Savings, and their Applications to Provident Purposes* (Orr & Co.), just out. The latter contains some important observations on Odd Fellows' and Friendly Societies, founded on the reports of the Lords and Commons, and other trustworthy information.

11—Engineer. Animalculæ.—We quote the following from the excellent *Hand-Book of Natural Philosophy and Astronomy*, by Dr. Lardner, just published by Messrs. Taylor, Walton & Maberley. Microscopic research has disclosed the existence of animals, a million of which do not exceed the bulk of a grain of sand; and yet each of these is composed of members as admirably suited to their mode of life as those of the largest species. Their motions display all the phenomena of vitality, sense, and instinct. In the liquids which they inhabit, they are observed to move with the most surprising speed and agility; nor are their motions and actions blind and fortuitous, but evidently governed by choice, and directed to an end. They use food and drink, by which they are nourished, and must therefore be supplied with a digestive apparatus. They exhibit a muscular power far exceeding in strength and flexibility, relatively speaking, the larger species. They are susceptible of the same appetites, and obnoxious to the same passions, as the superior animals; and, though differing in degree, the satisfaction of these desires is attended with the same results as in our own species. Spallanzani observes, that certain animalculæ devour others so voraciously, that they fatten and become indolent and sluggish by over-feeding. After a meal of this kind, if they be confined in distilled water, so as to be deprived of all food, their condition becomes reduced, they regain their spirit and activity, and once more amuse themselves in pursuit of the more minute animals which are supplied to them. These they swallow without depriving them of life, as, by the aid of the microscope, the smaller, thus devoured, has been observed moving within the body of the greater. The microscopic researches of Ehrenberg have disclosed most surprising examples of the minuteness of which organised matter is susceptible. He has shown that many species of Infusoria exist, which are so small that millions of them collected into one mass would not exceed the bulk of a grain of sand, and a thousand might swim side by side through the eye of a needle. The shells of these creatures are found to exist fossilized in the strata of the earth, in quantities so great as almost to exceed the limits of credibility. By microscopic measurement, it has been ascertained that in the slate found at Bilin, in Bohemia, which consists almost entirely of these shells, a cubic inch contains forty-one thousand millions; and as a cubic inch weighs two hundred and twenty grains, it follows that one hundred and eighty score millions of these shells must go to a grain, each of which would consequently weigh the 187,000,000th part of a grain. All these phenomena lead to the conclusion, that these creatures must be supplied with an organization corresponding in beauty with those of the larger species.

POPULAR GEOLOGY.

CHAPTER II.—THE MEANS OF GEOLOGICAL STUDY: STRATIFICATION.



THE EARTH'S CRUST.

a, Line representing the supposed limits of the atmosphere, 45 miles above the earth. *b*, Level of the sea. *c*, Depth of 100 miles on the radius. *d*, Depth of 500 miles. The black part represents the supposed thickness of the earth's crust.

17. *All geological knowledge is derived from an examination of the earth's Crust*, a word expressive, at once, of the thinness of that exterior covering with which alone the science is concerned, and of the difference that exists between the covering and the profound, unknown abyss that lies beneath.

18. *Apparent insufficiency, but real value of the Crust.*—When, in looking at the black line in the above diagram, which includes a depth of fifteen miles, or nearly three times the actual depth to which our observations have really been able to extend, and comparing it with the depth of the earth from the surface to the centre (of which depth only an eighth part is there shown) we are told, "Within that black line are confined all our means of geological investigation," we may naturally feel disappointed at the apparent inadequacy of the materials afforded. But the case is not so. And mainly for this broad reason—that as the crust *does* show us, under a variety of circumstances, the lowest of all rock formations—the granitic, or crystalline—below which no signs of periodical formation or of life, in connexion with even the remotest eras, can be found; it is therefore probable that we have really within our grasp a complete series of remains of the varying and mighty phenomena that have marked the material history of our globe; and that, even if there be deficiencies, through the changes that have taken place, under the operation of those natural influences, still ever at work around us, it is all but certain that these deficiencies could not be supplied by deeper descents into the solid substance beneath. But the fact that we can, under certain circumstances, look upon this universal floor of all things, as when, for instance, it is protruded to or above the surface, by expansive interior forces, does not at first glance suggest how it is that we are enabled to trace, step by step, the nature of the various masses that generally lie above it. Although the loftiest mountains rise to nearly the height of five miles, they are mainly of granite, or other igneous formations, and leave generally the lower formations above them as difficult to examine to any depth, as in their natural

position. The deepest mines, again, only descend about the third of a mile, and therefore can but exhibit portions of the contents of the crust. How is it, then, that Geology, with such seemingly limited opportunities for study, has risen to the rank of a science? We may answer by the enunciation of the following propositions:—

19. *Opportunities for studying the Crust.*—First: although we cannot descend into the bowels of the earth, to such depths as might enable us to trace, in their normal aspect, the nature of all the materials that overlie the granite floor; the materials themselves have been in innumerable cases forced up to the surface, without, for the most part, losing the distinctive features of their original position. Again, in all parts of the world are found deep natural excavations, the edges of which tell their history eloquently to those who know how to understand such geological effects. River banks and the shores of the sea often exhibit the same opportunities. Lastly; when a great depth of the earth's crust has been forced upwards in an inclined position, it is obvious that what was the lowest portion, may become not very materially lower in its new position than that which was originally the highest, the latter probably being depressed by the same operation. Let us illustrate this by a familiar image:—Take a pack of cards; hold them so firmly together that they remain in juxtaposition, but so loosely, that when the edges are pressed upon the table in an inclined position, they will form themselves into a line agreeing with the angle of that inclination, slightly overtopping each other, like a series of minute steps. Let these steps be visible on the left, rising upwards, and, of course, concealed on the right by the overtopping edges. Then hold the pack horizontally, but with the right edge a little depressed, and you will have an exact representation of the state in which we often find a number of layers of the earth's substance. If, now, excavations are made—as in mining, or in boring for water—at different portions of that group of layers, those made at the end where lies the original surface, will penetrate through, possibly, the first three layers, as Nos. 1, 2, 3; the next may have No. 2 at the top, or surface, and therefore may go through 2, 3, 4; the next through 3, 4, 5; and so on, until a series of excavations, thus made, under favourable circumstances, may show us in complete detail, the character of every layer, and their successional relation to each other.

20. *The Crust is found disposed in layers or strata.*—By these, and similar means, we arrive at the discovery that all the rocks, soils, minerals, &c., that constitute the substance of the earth's crust, are arranged in distinct layers or beds, spread out, or strewed one above another, hence called *strata*.

21. *These strata always occupy determinate relative positions.*—Strata, when lying in their natural undisturbed positions, invariably occupy a certain regular determinate order, so that, for instance, if groups of six different strata or formations be found in different parts of the world, that six will always be discovered in the same successional order; or, in other words, that while certain strata requisite to form a complete group may be missing from the group, those that are found together will always exhibit, if undisturbed by what we may call accident, the same relative order of super-imposition.

22. *And contain distinct animal and vegetable remains or fossils.*—Whilst strata are thus distinguished from each other, we find that each stratum contains a distinct series of remains of vegetable and animal life, showing, in fact, what were the living inhabitants of the globe at the time each layer was deposited. It is not meant to say that all the constituent individual species of the Flora and Fauna of any one particular formation or strata are entirely different from those of every other, but simply that, taken as a whole, each formation differs from the one above or below it.

23. *The chief instruments of geological investigation recapitulated.*—These, then, are the chief instruments of geological investigation, and it will be seen that they are sufficiently powerful to task all the efforts of science to make the best use of them. To recapitulate: The earth's crust, though thin as compared with the substance of the globe, contains probably all the essential materials that can be required for study; and that crust is, under one form or another, available through its entire depth for our examination. We

And that crust formed of a series of layers, dispersed in a regular determinate order; each evidently having been the surface of the globe for a time probably of incalculable extent, and each having its own peculiar system of organic life.

24. *Scientific and popular notions of the crust directly opposed.*—Nothing, therefore, can be more opposed than these facts to the popular notions that have so long existed, which look upon the superficial substance of the earth as a confused agglomeration of various soils, and rocks, and minerals, simultaneously brought into existence by one act of creation.

25. *Geological meaning of the word Rock.*—All the various substances which compose the earth's crust, as sand, gravel, clay, peat, rocks of all kinds, popularly so called, coal, slate, minerals, &c., are summed up by geologists into the one word rocks; and this without reference to the fact whether they be soft or stony.

26. *Chief Geological division of Rocks.*—These rocks are divided into two great classes:—

I. Igneous, or unstratified rocks.

II. Aqueous, or stratified rocks.

27. *Igneous Rocks, unstratified.*—Igneous rocks, as we have already had occasion to show, are those resulting from the operation of heat, and which crystallize in the process of cooling. They are, of course, unstratified, and destitute of all organic remains. Granite is the great exemplar.

28. *Aqueous Rocks, stratified.*—Aqueous rocks include all those that extend upward from the underlying granite or igneous rocks; and are so called because they have evidently all been deposited as sediment from water, and mostly in the shape of sand, clay, &c., which were subsequently hardened and in various other ways affected by subterranean heat, and also by the superincumbent pressure of other formations that were gradually deposited upon them.

29. *Modes of deposition, &c., of Aqueous Rocks.*—Aqueous rocks deposited in seas, can be distinguished from those deposited in the waters of lakes and estuaries by the kinds of fossils contained in them; some, of course, obviously being inhabitants of salt, others only of fresh water. We can also learn much of the climate that prevailed during any particular formation, by studying the character of the fossil vegetation it has left behind. Plants of a kind that only now exist in a tropical climate, doubtless, had such a climate then.

30. *Difference of Structure of Aqueous Rocks.*—The differences of structure existing among different strata, as, for instance, between the fine grain and thin laminæ of slate, and the coarse conglomerate of gravel; or again, between the soft, white, incombustible substance of chalk, and the hard, black, highly inflammable coal, imply great difference in the circumstances under which such varying materials were deposited, independent of their common watery origin. These circumstances, as far as known, we shall have to investigate at greater length, when we consider the several chief formations in detail. We shall therefore, for the present, merely show, generally, their natural origin.

31. *Substance of Aqueous Rocks—whence obtained.*—Starting from that granitic crust, which, with vast and profound oceans, seem to have formed the infant condition of the earth, we can readily perceive that each group of strata has been formed from its predecessors, by the operation of laws still at work. Thus the atmosphere, by its mechanical and chemical powers, wears down the rocks; the particles are carried by rivers to the sea, then gradually deposited, hardened and altered by heat and pressure, and at last assume that state in which, when time and physical revolutions have done their work, they may each become to man, one of the leaves of the great book of geological history. We need, at present, give only a single illustration of the fact, that the later rocks are thus formed from the earlier. The gneiss rocks, found immediately above the granite, are composed of materials that every one can see at a glance, are but slightly altered from granite.

32. *Accidental Positions of Strata.*—The positions of rocks are, in their normal state, nearly horizontal, though the circumstances under which we generally see them, as already explained, cause them to be greatly modified. Earthquakes and volcanoes have thrown them into a thousand different forms—grand, beautiful, and fantastic. Their lesser characteristics of position are geologically resolved into the following technical divisions:—Fractures or disruptions, overlying strata, false or pseudo-intrstratification, veins, faults, dykes, slips, hitches, &c., &c.

33. *Fractures* may be single—that is, unaccompanied with discharges of fluid—or upheaving of solid igneous matter, beyond the surface. Thus, expansive forces from below crack the solid earth above, obtain vent, and leave behind them vast fissures. Or, fractures may arise from the sudden uplifting of an enormous bulk of solid rock, which, penetrating the crust, rises upward into the stature of a vast mountain, or perhaps, even into a widely extending range of mountains.

34. *Overlying Strata.*—Or, the mass so driven up and vomited forth, may be in a state of fusion, and accordingly spread itself over the neighbouring surface strata, and hence be called overlying.

35. *False, or interstratification.*—Or, raised upwards less powerfully, the intruding granite may, simply, force its way between the superincumbent strata, and there remain as an example of false, or interstratification.

36. *Dykes.*—Or, still more weakly impelled, it may find its way into some small existing fissure, and so form a dyke; and which does not always run merely in a vertical or inclined position towards the surface, but sometimes extends horizontally. Thus we sometimes see dykes of granite extending along the ground like an artificially raised wall, the softer strata in which they were embedded having wasted away.

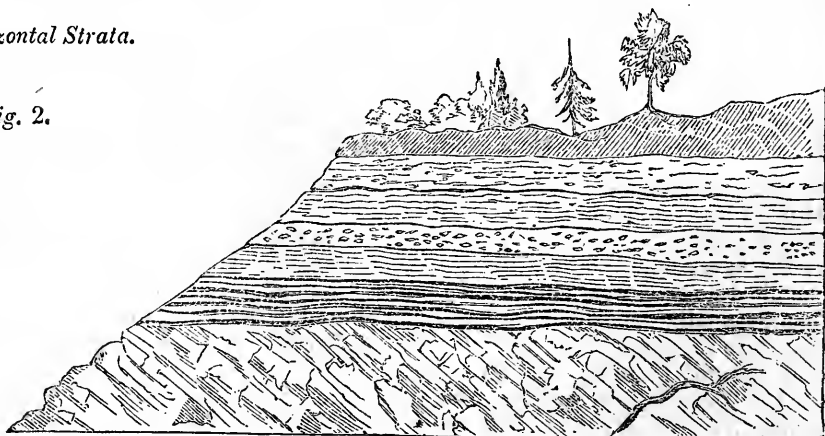
37. *Veins.*—Or, lastly, the expanding force may drive the igneous, and in this case, evidently fused rock, into a great number of branching and minute crevices, to which geologists give the name of veins.

38. *Faults.*—By the word fault is meant that some portions of rocks or strata, having been lifted, and disrupted, the edges, in falling, have fallen into positions different from that they originally occupied as regards each other, even though again touching. *Fig. 3* affords an example.

39. *Slips.*—A slip is a minor fault, and expresses the fact, that while an upheaved and divided body falls back again, each part with the same horizontal position as it before occupied, one side falls lower than the other. THE FORMS OF STRATA may be all comprised within the following:—

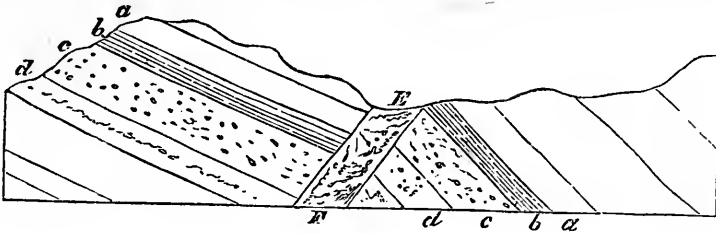
40. *Horizontal Strata.*

Fig. 2.



This diagram is intended to show how different strata are found lying horizontally upon each other, and must not be supposed to represent any particular rocks.

Fig. 3.
Vertical
Strata, and
Fault.



41. (Fig. 3.) Inclined strata, with fault in the centre, filled with rubbish. Strata in this position must have been raised, and dislocated by expansive forces from beneath. The angle which inclined strata present to the horizon is called the *dip*, or angle of inclination.

42. (Fig. 4.) *Vertical Strata*.—This engraving presents a good example of a very interesting kind of stratification. "Vertical strata afford," says Sir Charles Lyell, from whom we borrow this and one or two other illustrations, "the most unequivocal evidences of a change in the original position. . . . We find in Scotland, in the northern skirts of the Grampians, beds of pudding stone, alternating with the layers of fine sand, all placed vertically to the horizon. When Saussure first observed certain conglomerates in a similar position in the Swiss Alps, he remarked that the pebbles, being for the most part of an oval shape, had their longer axes parallel to the planes of their stratification. (See Fig. 4.) From this he inferred that such strata must, at first, have been horizontal, such oval pebble having originally settled at the bottom of the water, with its flatter side parallel to the longer, for the same reason that an egg will not stand on either end if unsupported.

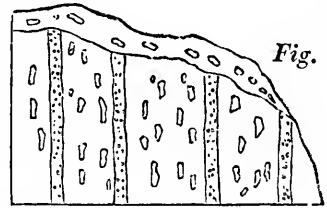
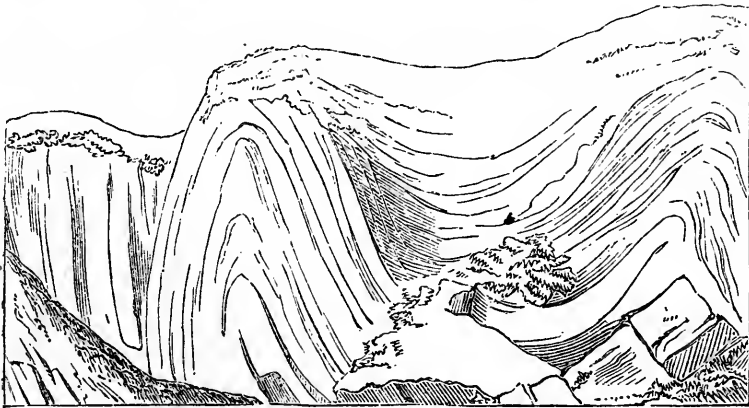


Fig. 4.

Example of Vertical Conglomerate and Sandstone from the Swiss Alps.—VERTICAL STRATA.



43. (Fig. 5.) *Curved or Contorted Strata of Slate, near St. Ann's Head, Berwickshire*. Sir James Hall explains very happily the mode in which these strata were formed. He placed a set of layers of clay under a weight, and then pressed their opposite ends together with such violence as to compel them to approach. On the removal of the weight, the layers of clay were found curved after the manner shown in the above engraving.

44. *Unconformable Strata*.—Our example is chosen from the junction of the old red

sandstone and Silurian schist, at the Siccar Point, near St. Anne's Head, Berwickshire.

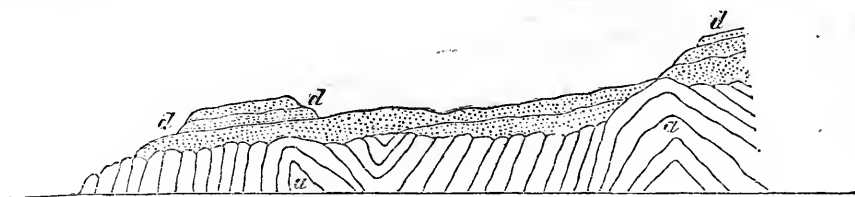


Fig. 6.—UNCONFORMABLE STRATA.

Its meaning is obvious; while the lower stratum is inclined or vertical, the upper is horizontal: such combinations are called unconformable. The explanation is easy. The inclined stratum was raised and turned out of its natural position, and then the next was naturally formed horizontally upon it.

45. *Other Strata* are also distinguished by special names, as, *Tilted*, when suddenly bent up by subterranean force; *saddle-back*, or anticlinal, when dipping from a common ridge in two opposite directions; and *trough*, or basin-like, or synclinal, when exhibiting the reverse of the last position, or dipping from opposite directions to a common point. When a stratum comes to the surface and appears, it is said to *crop out*.



THE MUTATIONS OF THE WORLD'S SURFACE.

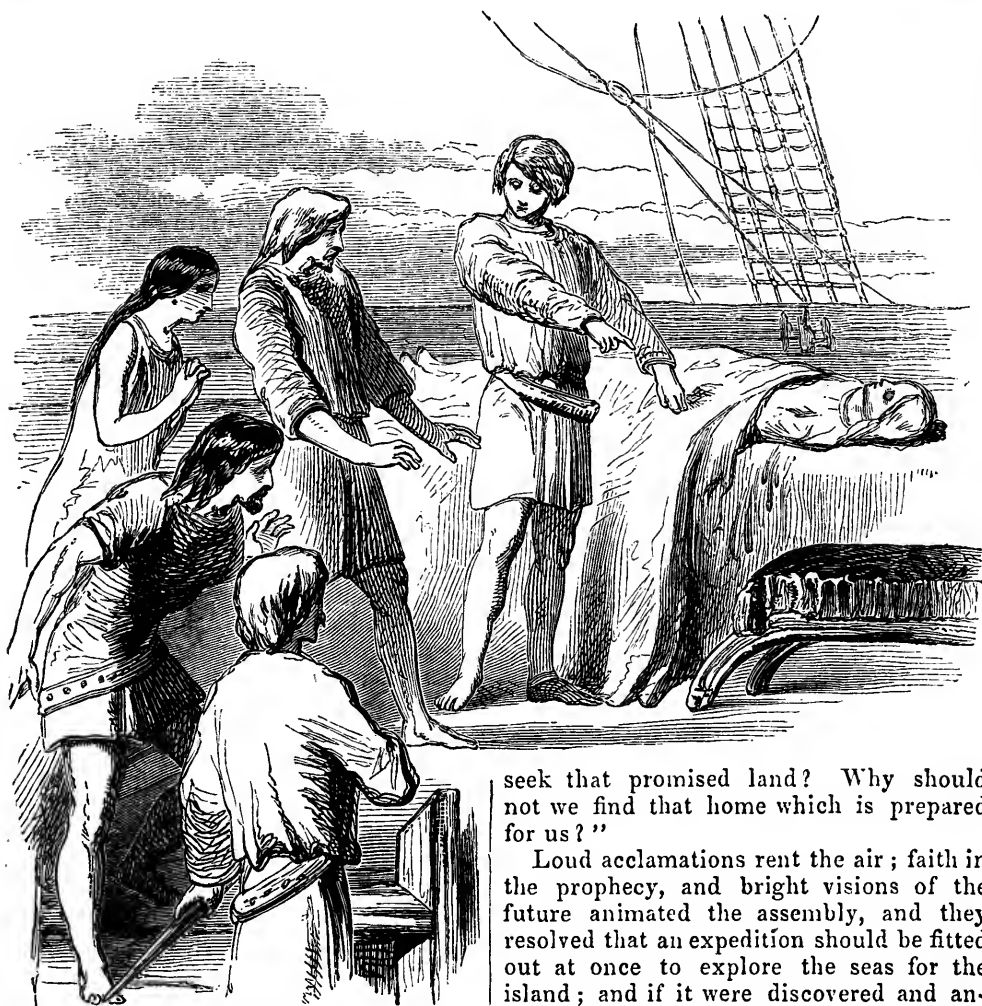
[THE following passage, from an Arabian writer of the 13th century, forms a striking illustration of the geological changes that are ever going on, and of the consequent effects on man. Of course, it is not intended to represent any kind of literal truth, though, were we to substitute ten or fifteen centuries for five, it is probable that a sufficient acquaintance with the physical history of the globe would furnish many examples quite as remarkable as the one here imagined.—ED.] “I passed one day by a very ancient and populous city, and asked one of its inhabitants how long it had been founded. ‘It is, indeed, a mighty city,’ replied he; ‘we know not how long it has existed, and our ancestors were, on this subject, as ignorant as ourselves.’ Five centuries afterwards, as I passed by the same place, I could not perceive the slightest vestige of the city. I demanded of a peasant, who was gathering herbs upon its former site, how long it had been destroyed. ‘In sooth, a strange question,’ replied he; ‘the ground has never been different from what you now behold it.’ ‘Was there not, of old,’ said I, ‘a splendid city here?’ ‘Never,’ answered he, ‘so far as we have seen; and never did our fathers speak to us of such.’ On my return there, five hundred years afterwards, I found the sea in the same place, and on its shores were a party of fishermen, of whom I inquired how long the land had been covered by the waters. ‘Is this a question,’ said they, ‘for a man like you? This spot has always been what it is now.’ I again returned, five hundred years afterwards, and the sea had disappeared; I inquired of a man, who stood alone upon the spot, how long this change had taken place, and he gave me the same answer as I had received before. Lastly, on coming back again after an equal lapse of time, I found there a flourishing city, more populous, and more rich in beautiful buildings, than the city I had seen the first time; and when I would fain have informed myself concerning its origin, the inhabitants answered me, ‘Its rise is lost in remote antiquity: we are ignorant how long it has existed, and our fathers were, on this subject, as ignorant as ourselves.’”

THE WESTERN ISLE.

It was summer; but two or three arid seasons, and an intense heat had scathed vegetation; the citron groves of Galicia no longer bent beneath their load of golden fruit—the vines and olives no longer exhibited their usual profusion; the corn was blighted on the stalk; the very tints of the flowers wore a sickly hue. Rivers and lakes, on whose smooth surface many a summer sun had been cheerfully reflected, had now sunk so far below their level as to appear set in gloom; mountain torrents that had rushed impetuously from their rocky heights, were now wasted to a thread, the birds were drooping on their wings, and the wild animals lost their natural timidity, and, in their nearer approach towards man, seemed, as it were, demanding their necessary food. All nature presented an aspect of melancholy, sadly reflected in the countenances of those who had assembled in consultation. They were the Gadilians, who, having left Scythia and traversed Egypt, had now been sojourning for many years in Spain, where they were held in great estimation and raised to high honour. Twice did Ith essay to break the mournful silence; but overcome by emotion, he was obliged to pause; words, however, at length came—"We must not suffer our little ones to perish for lack of food," said he; "it behoves us to save our families and ourselves from the dangers which beset us; famine on one side—for the corn, and wine, and oil must fail before the lapse of many months; already is the scarcity telling fearfully in the provinces—on the other side, we are threatened with a still more appalling danger, from the incursions of a barbarous race, who are grasping for plunder and for blood. Already are the Goths making inroads on the land: it is time for us to bend our way to other regions: but wheresoever the gods may direct us, we will bear with us that, of which no troubles, no enemies can deprive us—our direct descent from the royalty of Scythia—from a line of the most heroic and the most learned among men. We will bear with us all the arts and sciences of Scythia and of Egypt, kingdoms where the deeds of our race will be ever held in remembrance; and if we could forget our great progenitor, the renowned Gadilus,

we have this to bring to mind the miracles by which a life so precious was preserved to his parents and his people." As he spoke, Ith unfurled the banner which he held: it represented a dead serpent and the rod of Moses, a device to commemorate the miracle by which the life of Gadilus had been saved. While sleeping one day, a serpent had bitten him in the neck; his father Niul, younger son of the king of Scythia, and his people, carried the child to the camp of the Israelites, where the distracted father implored the prayers and aid of Moses: the intercessory prayers were offered, and the wound touched by the rod of the prophet, and the young prince escaped harm from the subtle poison.* Historians say that a prophecy accompanied the miracle, and foretold that the posterity of the prince should inhabit a country in which no venomous creature could live. "The home of the great and good Milesius," continued Ith, "can never be forgotten among us: he, indeed, must be ever remembered with pride and love, whose valiant exploits and righteous dealing have benefitted every country where he sojourned, and won for himself command and reverence. We cannot forget that the sovereign of Egypt sought alliance with him as an honour, and bestowed on him the hand of his beloved daughter, Scota. Oh, my friends! his fame and his virtues are themes of which I could never tire; I, who claimed the close relationship of uncle to him, may best speak of them in quitting the shores of Spain. Surely our greatest pang will be in leaving the remains of one so beloved. Tears fell from Ith as he spoke, and the sons of Milesius renewed their lamentations. The twelve youths who had attended Milesius in his travels, to be instructed in the learning of Phœnicia and Egypt, wept bitterly as they heard the praises of their loved master. The little children, too, who stood apart, wrung their tiny hands, for they grieved to think of leaving "lovely Spain," and all the scenes of their childish sports—the groves where they had so often played, and the pet birds which they had tamed to feed from their hands. "For a decision which way to turn, we must look to Amhergin's guidance—doubly fitted to direct, as the son of Mile-

* Keathing.



sins, and as our great high-priest." Ith waved his hand as he looked towards Amhergin, in token that they awaited his instructions. He advanced, and his countenance expressed the devotional feelings in which he had pursued some recent occupations. "I have examined the sacred books committed to my keeping," said he, "and I have found the prediction of my revered predecessor, Caicer; it immediately followed his sacrifice to Neptune. It foretells that the posterity of Gadilus would find no rest till they reached a Western Isle, beautiful and abundant, which it was decreed should fall to them as their inheritance—"

"We," interrupted Ith, "we, my friends, are that posterity. Why should we not

seek that promised land? Why should not we find that home which is prepared for us?"

Loud acclamations rent the air; faith in the prophecy, and bright visions of the future animated the assembly, and they resolved that an expedition should be fitted out at once to explore the seas for the island; and if it were discovered and answered expectations, that the Gadilians should lose no time in preparing for emigration. Ith was unanimously chosen to take the chief command of the expedition. A ship was fitted out with provisions and all that was necessary; a hundred and fifty of the most experienced Gadilian soldiers were selected to accompany Ith, and his son Lughaidh was to be his companion. All being ready, they weighed anchor, and steered their course towards Ireland.

Ireland abounds with antiquities which evidently belong to the most remote period, although their date baffles all research. Historians agree in tracing the settlements made there, after the flood, to the Celtic race—descended from Gomer, one of the sons of Japhet. The first colony after the

flood was Partholians; so called as the sons of Partholanus. They, however, were not destined to possess the land for any great length of time; as the entire settlement was swept off in three hundred years after, by a dreadful plague. A lengthened account of this is given in the Psaltic of Cashel, and other annals; but this, and their arrival in the island, is despatched in few words by one of the ancient poets; thus given in English:—

“The Greeks came o’er,
And anchors cast, and landed on the shore.

* * * * *

Three hundred years this warlike progeny
Possessed the island; till the plague destroyed,
Th’ inhabitants, and left the country waste.”

It is stated that the island remained depopulated for thirty years after the plague. Nemedius and his followers, at the end of that time, sailed over from the Euxine Sea, and reaching Ireland, settled themselves there. They were, however, superseded by an invading party of African pirates, who took possession of the island. Such of the Nemedians as remained in the country, were treated with the utmost barbarity by the usurpers. Scarcely less unfortunate were those who found their way to Greece, where they hoped to enjoy peace and liberty; but when their numbers increased, the jealousy of the Grecians was excited so much, that, to keep them in subjection, they imposed the heaviest burdens on them; obliging them to sink pits and dig clay in the valleys, and to carry it in leather bags to the tops of the highest mountains and most rugged rocks, to form a soil in those barren situations fit for produce; the name they bore—*Firbolg*, expressed their occupation; for *bolg* signifies bag, and *fir* is man; so it may be rendered “bag-man.” Groaning under this oppression, they conspired to effect an escape; their plans were so well laid, and so secretly carried on, that they were crowned with complete success. They were now about five thousand strong; and seizing some of the Grecian shipping, in which they set sail for Ireland, effected a landing in various parts of the island, and succeeded in becoming its masters. They were, however, brought under subjection by another colony—the Tuatha de Danans; the descendants of those who had followed the younger son of Nemedias, when driven, by the cruel treatment of the

African pirates, who had usurped the island, to seek refuge in a distant island. It was near Thebes, according to Pomponius Mela, where they settled, and where they were supposed to have devoted themselves to the study of necromancy; the experiments in which they delighted were ascribed entirely to magic. To such a height was the conception of their sorcery carried, that they were deemed capable of performing the most stupendous miracles—even to the raising of the dead. So thoroughly convinced were the Assyrians that the Tuatha de Danans possessed this power, that they abandoned the siege of Athens; alleging, that as they were leagued against them, they could not succeed, for it was useless to contend with those who had the power of reanimating their slain. A Druid, however, furnished them with a counter-charm, which in some measure revived their hopes. He assured them that if “a stake of quick beam-wood were thrust through each of the dead bodies,” the necromancer’s skill would be rendered of no avail. Anxious to put this counter-charm to the test, the Assyrians dared the Tuatha de Danans to battle, and fought with more than their wonted courage, and gained a decisive victory; and according to the direction of the Druid, they drove the stakes through the dead bodies of their enemies, who never troubled them again; and, as some of the ancient historians sagely remark, “the sorcerers were disappointed.” After their discomfiture, the Tuatha de Danans resolved to quit the country for fear of falling into the hands of the Assyrians.

In every age, those who have been in advance of it in skill and in the knowledge of science, have become the objects of superstitious suspicion; and the names of some of the greatest benefactors of mankind might be cited to prove the persecutions to which their superior intelligence and valuable discoveries subjected them. There never was a new discovery that was not looked on with a jealous eye, and which was not strenuously opposed by the ignorant. The human mind, ever prone to refer what they cannot understand to supernatural agency, will believe striking effects to be the result of anything rather than natural causes. The whole course of the battle is easily explained. The reputed necromancers may, indeed, have been acquainted with some of the mysteries of the

healing art, and may have applied them with success to those on the battle-field, in whom life still lingered. The Assyrians, believing themselves possessed of a counter-charm, naturally fought with more than their accustomed energy; and, by attending to the Druid's injunction, they must have effectually extinguished whatever sparks of life might have remained in those who had fallen. After their defeat, the Tuatha de Danans wandered from place to place; they at length reached Denmark and Norway, where they met with a kind reception, and whence their learning and reputation for skill in magic were held in high reverence. Such an effect did the experiments which they exhibited produce, that four cities were placed at their disposal, in which to erect schools for the instruction of youth in the art of magic. Whether they succeeded as instructors, or found apt scholars, has not been recorded; but it is certain, that after a time they passed into other countries. They remained for seven years in the north of Scotland. While in Denmark and Norway, they had possessed themselves of four curiosities of great antiquity, and as reputed, of rare virtue; these were the well-tried sword, which Luighaida Lampfhada, the Long-handed, was wont to use in battle; a spear, with which he also fought; and a cauldron, supposed to be possessed of mysterious properties; and, most valuable of all, the *Lia-fail*, or stone of destiny. With these treasures they proceeded to Ireland. The *Lia-fail* was held in such estimation, that it was customary for the Irish king to stand on it during his inauguration; it was believed at such times to emit a musical sound; its fame was such, that Fergus, when about to be crowned in Scotland, sent to borrow the stone. After the coronation, it was reverently placed in the Abbey of Scone, where it was kept with great care, till seized on by Edward I. of England, and placed under the Coronation chair of Westminster Abbey. From this stone, Ireland takes one of her names—the name by which her bards best loved to call her—*Inis-fail*—the Island of Destiny. The fog which enveloped the Tuatha de Danans, on their landing in Ireland, and enabled them to pursue their march unobserved through the country, was ascribed to their incantations. To the same evil agency, some of

the ancient bards of Ireland place the victory which they gained over the Finbolgs, whom they dared to battle, if they would not quietly submit to give up the kingdom. After their defeat, the Finbolgs chiefly inhabited Connaught, submitting to the rule of those whom they believed endowed with supernatural power. To them, the most common actions of the new settlers bore a mysterious import, and many were the marvels related of them; they were believed to have an enchanted lake, in which various of their rites and transformations were reported to have taken place; a draught of its miraculous waters was said to impart knowledge. That lake may be seen on the mountain called Slieve Guillen, in the county of Armagh. Many of the legends and traditions connected with these waters have furnished the bards with "romances wild and beautiful as those of Ariosto." Superstition, ever loth to leave her favourite haunts, still lingers by the margin of that lake, which is supposed to retain some of its magical properties. A heap of stones is piled beside the lake, where a witch was supposed to reside; and the path which surrounds it goes by the name of "the path to the witch's house." Between thirty and forty years since, some of the neighbouring peasantry, actuated by the natural antipathy to witches, determined to attack her in her stronghold, and for the purpose of ascertaining the exact spot where she dwelt, they removed some of the stones, and penetrated into a cave where, however, they discovered nothing but some human bones, the witch having prudently absconded. Many of the superstitions of the country are connected with those monuments of antiquity, which point to remote times, and some of which are believed by antiquarians to have been the work of the Tuatha de Danans, who were skilled in building. The raths, or fortresses, are supposed to have been erected by them and the Finbolgs: as the greater number of them are found in the interior of the country, to which the Danes never penetrated, they could not have been Danish forts, though they have been frequently so called. There is scarcely a county in Ireland in which these raths are not found. These circular earthen ramparts, surrounded by a deep fosse, occupy from half an acre to two acres, and are mostly on rising ground. The superstitious veneration

tion in which these monuments of antiquity have been held by the peasantry, has been the means of their preservation; from time immemorial they have been looked on as enchanted ground, and the disturbance of a lias or rath they think would be sure to be followed by an irreparable misfortune. The Tuatha de Danans, transformed into fairies, are believed to inhabit these raths; thus, Danans are, indeed, often mentioned by the bards, as fairies; and in the clouds of dust raised by a sudden whirlwind, imagination sees the rapid movements of the fairy king; and it is no uncommon thing to see the peasants doff their hats and stand uncovered till the gale has passed.

The Tuatha de Danans had ruled in Ireland for nearly two centuries, when a violent dispute arose among the three princes, sons of the ninth king of Ireland, under their dynasty; the division of property caused these bitter contentions. Their father had left considerable treasure, and they could not come to an amicable agreement as to its distribution. The contest became so fierce that they would inevitably have had recourse to arms for a decision, had not another umpire arrived. The brothers stood in angry dispute in one of those beautiful valleys through which the river Foyle glides along; the turbulent passions by which they were agitated, were strangely contrasted with the scenery by which they were surrounded. The mountains which rose beyond seemed to shut in that sweet vale from the turmoils of the world; the solemn woods, stretching to the right; the verdant turf, and the gentle flow of the river, appeared to invite repose. The brothers stood glaring on each other in violence and anger, in that valley, where they had so often sported along in childish glee, culling wild flowers to weave into garlands for each other; or scrambling through the bushes and briars, collecting berries for a brother's offering; the hands which had been so liberal of Nature's treasures, were now grasping to snatch a double share of worldly wealth; the hands that once were filled with love, now panted for the battlefield! A messenger arrived at the moment, to announce the approach of a stranger and his retinue, who had landed on the island to take in water and provisions, and who did not wish to depart without saluting the princes of the island. Ith came forward in

advance of his followers, and his appearance at once impressed the princes in his favour: his mantle hung gracefully on a form which, though slightly bent by time, was remarkable for dignity; the raven locks had turned to silver; and though the flash of youth no longer lit his dark eyes, they still beamed with intelligence and benignity. Lughaidh was by his side, and the graces of early youth had lingered beyond their usual time about one who loved his father with all the passionate fondness of childhood. The childlike admiration and attention with which he hung on every word which his father uttered, interested even strangers in his favour; and how grateful to Ith must the attentions have been, which are so precious when performed from love! The dispute among the brethren was suspended for awhile, that the sacred rites of hospitality might not be violated. The strangers were made welcome to the abode of royalty, to which they ascended by the mountain path. The palace of Aileach, so long the pride of Donegal, stood nobly on its eminence, commanding a magnificent view. This celebrated fortress was of immense strength, constructed of large stones fitted together without cement; the walls are said to have been of the thickness of fifteen feet; it was in the style of architecture which is denominated Cyclopean; its form was circular, and it was surrounded by three large earthen ramparts; its interior was portioned out into apartments suitable for royal accommodation and officers of state. In a very ancient work, called *Dinscanchus*, we find a description of this ancient fortress, which intimated a considerable degree of embellishment, and also alludes to the sepulchres of some of the kings, which were within the precincts.

"Many its houses, rare its stones,
And just were its tributes;
Lofty castle is Aileach Fierin,
The rath of the worthy man.

"Pleasant stone fortress—
Protecting house of heroes;
Here the Dagda slept,
On this hill—red are its flowers.

"Delightful seat is Aileach Gebean;
Greenly blooming are its bushes."

The noble ruins of Aileach are monuments of former grandeur that cannot be seen without interest; traces of the road which led along from the rocks to the fortress are still visible. The grand features

of the country where this noble pile was erected must have made it a delightful residence; the lofty mountain ranges, Lough Foyle and Lough Smilly, expanding into an arm of the sea, and the most romantic vales and glens form its surrounding scenery.

Notwithstanding the restraint which the princes put on their feelings in the presence of Ith, he had lived too long in the world not to have a quick perception of the working of the passions, however veiled by the usages of courtesy; he perceived at once that the brothers were at variance; but of this it was not his place to take notice; but feeling deeply the loveliness of unity among brothers, he managed, in the course of conversation, to touch on the subject. His simple eloquence produced its effects, and the princes desired to be as brothers again; they agreed to leave the matter in dispute to one so good and wise, and who, being a stranger to all, would not be biassed by partiality to any. They opened their minds, and told him how the affair stood, and that they had resolved to abide by his decision. His adjustment was so fair that all were satisfied, and the equitable and amicable division took place in presence of Ith. The brothers, relieved from a painful and unnatural restraint, now vied with each other in hospitable offices. The feast was spread in the lofty halls, and the cup went gaily round, and the hours sped in friendly discourse; and then followed sweet repose, on couches prepared of rushes and the softest moss. At parting the next morning, Ith again exhorted to brotherly love, observing that nothing seemed wanting to their happiness, placed as they were in the midst of such an enchanting scene, where nature had done everything for them. He then spoke of the salubrity of the air, the pureness of their fountains, and the abundance with which the earth teemed. The brothers stood in silence for some time after Ith and his companions had taken leave, watching them as they wound along the mountain path. When they were lost to sight, the princes looked earnestly at each other, and at length breaking silence, said one to the other, "Marked you the stranger, how he cast his looks around, as it were to take in the length and breadth of the land? how lost in admiration he was with the beauty of our island! how ardently he expressed himself!

how he praised our springs, and fruits, and game, and everything we placed before him! how searching were his questions relative to the resources and produce of the country! Alas, alas! what may we not fear? His ship reached our shores in safety; he did not advance till he had sacrificed to Neptune, it seems: did the omens justify his temerity? does he think the gods approve his designs? If he return, it will not be as a guest, but as a usurper. What, what is to be done?"

Words of fearful import, uttered in impatient agitation, passed among them.

"But," said the younger prince, "they sate within our halls; they ate at our board, and drank from our cup; our roof sheltered them as they slept; they received hospitality which we freely offered: how can we do violence to them?"

A few arguments, vehemently urged by his brothers, overcame all his scruples; and ere Ith had reached the shore to embark, he was overtaken by one of the princes, with a hundred and fifty of his soldiers; they fell upon the rear of his little band, who fought their way with desperation to the shore; in the struggle, many of the brave Gadilians fell, and Ith himself received a fatal wound: he was conveyed on board the vessel, which immediately set sail. On the litter of rushes which Lughaidh had spread for him on the deck, Ith lay stark and cold, covered with his mantle; his eyes were still fondly bent on him who knelt by his side, holding his hand; and though the tears fell thick and fast from Lughaidh's eyes, he still would ask those who came nigh if they did not think the good old man might yet recover from the injury, and stay by his side for many a year to come. "Often had those," he would say, "who had been left for dead upon the battle-field, done well, and lived out many a day." But it was not so with Ith; before the vessel reached Corunna, he had breathed his last in the arms of Lughaidh. Friends were eagerly waiting; a ship was seen in the distance; as it neared, they knew it was that in which Ith and his brave companions had sailed. No sooner had it reached the shore than kinsmen and friends hastened on board to welcome their adventurers. There was an evident air of gloom on deck; there was none of the bustle and alacrity which is always re-

marked in a return ship; the deck looked thinly manned; they saw Lughaidh standing, with his arms mournfully crossed upon his breast, and his eyes bent upon the ground—it seemed as if he dared not raise them; a vague fear pervaded all who saw him.

"Ith, Ith!" they exclaimed. Lughaidh bent forward, and slowly and reverently raised the mantle which covered the remains of his father. The body of their beloved chieftain, cold and stiff, and with all its ghastly wounds, was a sad spectacle for those who had come to greet him with a welcome.

"Slain! slain!" was all poor Lughaidh could utter.

It is said that the first emotion in such cases is the desire of revenge,—so it was with the friends of Ith; and the word "Vengeance!" burst simultaneously from those who were looking on the pale corse. But softer feelings came, and the sons of Milesius threw themselves, weeping, into the arms of Lughaidh. They solemnly pledged themselves that their swords should never rest in their scabbards till the death of Ith was revenged; and they were not slow in making all the necessary arrangements for fitting out an expedition to attack the Tuatha de Danans. Thirty vessels were each manned with thirty of their choicest troops; commanders were appointed, and all that was necessary for the voyage was laid in. The ships sailed; but as they approached the shores of Ireland, a dreadful storm arose. Tempest-tossed, the squadron soon dispersed, and some of the vessels were wrecked. Five of the sons of Milesius were lost; the surviving three landed with their intrepid soldiers; a desperate battle ensued, in which they were victorious: but the fate of the country was not decided till another hard-fought engagement left the Milesians conquerors, and the three Tuatha de Danan princes among the slain on the field of battle.

It is stated by historians, that the Milesian race gave 118 kings to Ireland, celebrated in the annals of her history. In a year after the conquest of Ireland, Hereman, the son of Milesius, became sole monarch. His reign was so remarkable for justice, and a wise and virtuous policy, that he might be looked on as a bright example, even in the enlightened days of Christianity, which did not dawn on the island for upwards of

a thousand years after the accession of this pagan monarch. His laws were so equal, and his rule so parental, that those who might have been expected to continue his inveterate enemies became fast friends. The Firbolgs and Tuatha de Danans were not treated as a conquered people, but were equally favoured with his other subjects. They were employed in all public works; and as the language of all merely differed in dialects, all soon amalgamated and became as one nation.

REVIEWS OF NEW PUBLICATIONS.

For Publications received, See Cover, p. 3.

VIRGIL'S ÆNEID.

Galbraith's School and College Virgil. London and Dublin: S. J. Machen.

THIS is one of those books that gladden the heart of the earnest student, from the thoroughly complete character of the assistance they lend. Their authors have evidently plodded their own way through all the difficulties that beset the aspirant for classical knowledge, and having conquered them, turn round and hold out the hands to guide and direct the less advanced wayfarer. This goodly volume, which contains the entire Æneid, is, as its title imports, specially intended for "School and College," and its value in such quarters is obvious; but we would say to the youth or man who has obtained enough of Latin to be able just to get along, "Here is the very book to enable you, at last, to throw away all your literary crutches—aye, even itself, when you have only once succeeded in mastering its contents." Let us briefly describe what these are. A very informing life of Virgil, sprinkled over, as all lives should be, with anecdote and rational gossip—the whole twelve books of the poem in Latin; and then English notes, which are so voluminous as to occupy nearly two-thirds of the volume. There is, in fact, a paragraph (sometimes a long one) to every line of the original text, dealing with all sorts of verbal and grammatical difficulties, furnishing valuable bits of criticism, and, of course, including, as usual, the illustrative information that form the essential substance of

literary notes in general. We append an example. The lines—

“Quale manus addunt ebori decus, aut ubi flavo
Argentum Pariusve lapis circumdatur auro.”

are thus annotated:—

“*QUALE*, &c.—The construction in prose would be, “Tale decus Æneæ addidit, quale manus artificis addunt abori, aut argento, Pariove lapidi (marble), ubi flavo auro circumdatur. Vid. *Odys.* vi. * * * [We omit the Greek.] *Circumdatur* is ‘enchased.’ The comparison, says Heyne, is thus instituted:—As the yellowish hue of the gold serves as a foil to exhibit to greater advantage the brilliancy of ivory, silver, or marble, which may be set therein; so did the cloud in which Æneas had been wrapped (*circumfusa nubes*), add to his refulgent beauty, when bursting forth upon the astonished sight of Dido. Wagner conceives the beauty here described, to have consisted in Venus having communicated to ‘each single member’ a special comeliness, so as to produce a felicitous *tout ensemble*, as precious stones, &c., ‘individually’ of no great beauty, are exhibited in effective group, by skilful enchasement.”

Harry Brightside; or, The Young Traveller in Italy. London: T. Hatchard.

WHAT say young readers of the *Family Tutor*—for such readers he is sure he has, and would be sorry to lose—what say you to a visit to one of the most beautiful climes in the world, and to a country in which took place a great proportion of all the events that interest you so much in relation to ancient times? Should you not like to see Naples and its macaroni-eating lazzaroni, roam through the ruins of the palace of Julius Cæsar, or the baths of the cruel monster Nero, or by the side of Virgil’s tomb? Should you not like to climb up the steep side of Vesuvius, and tremble with a sort of delightful fear at the idea of peeping into the fearful crater itself? Then Pompeii and Herculaneum! what say you to being able to visit these once buried places, and which are now in parts restored almost to the aspect they bore so many centuries ago, before they were overwhelmed by the burning lava? Do you not leap with delight at the thought of the wonders they must have to show you at every step? And how you will laugh to find a railroad ready to take you to Pompeii! What an odd junction of things, ancient and modern! what a mingling of new and old civilization! Then there is Rome—that once capital of the world, with its Coliseum, where the gladiators fought—and the Tarpeian rock, from whence State

criminals were precipitated; and St. Peter’s, the largest of all cathedrals; and—but there is no end to the things to be seen. Now, what say you? should you like to go? Well, you may; and with a very agreeable companion—Harry Brightside, whom the Tutor begs to introduce to you. Ah, you understand; and you think you would rather go yourself, bodily, than only in mind by the aid of books. So would I; but when we can’t do that, then the other way is the next best—is it not? Here is a specimen of what Harry Brightside will show you in his Travels:—

“GATHERINGS FROM POMPEII IN THE MUSEUM AT NAPLES.

“Mr. Vernon pointed out to them, first of all, a round table in the centre of the room, containing jewels and other small things. In one case was a very old looking purse, with money in it, and laid by the side were several gold bracelets and rings, found on the arm and hand of a skeleton in the cellar of a house at Pompeii which, from an inscription outside, was found to belong to Diomedes. It is supposed this was his wife, who fled into the cellar for protection, and there perished. The purse was found in her hand. In another case were rings, necklaces, ear-rings, brooches, chains, and nets of gold; and also silver pins for ornamenting the hair, like those now used so universally in Italy.

“‘When was Pompeii destroyed, Papa?’ asked Harry.

“‘Seventy-nine years after Christ, my boy; and is it not wonderful that these gold and silver ornaments should have been made in such perfection then? Look, here is a small looking-glass, which belonged to some Pompeian lady; it is made of polished metal, instead of glass.’”

“In other cases round the room were different kinds of food. Two small loaves of bread, made in the shape of a tea-cake, with the name of the baker stamped on one; eggs, and a honeycomb, and a large bronze saucepan full of soup, which was being boiled on the fire when the destruction of the city took place. A bottle containing oil, and another containing olives; nets for catching birds and fishes; and a large quantity of paints, which, with the brushes, were found in a painter’s shop. All the party felt great interest in looking at one case after another, and then they went into the next room, filled with kitchen furniture, all made of bronze. The floor of each of the rooms is paved with mosaics, which were brought from Pompeii; these are different figures made of small pieces of coloured pottery or stone, and all fitted together just as carefully as a puzzle. At a distance, they look like pictures. In this room, the weights and scales were most admired; the chains being in a great variety of beautiful patterns. There were also kettles, stewpans, and saucepans, lined with silver; a portable stove for heating water, moulds for jellies; indeed, Mrs. Vernon, she felt sure, if her cook were brought there, she would find all that was necessary to furnish her kitchen with things for cooking.”

The travels are real, and of recent date.

Grandfather Whitehead's Catechisms. London: Houlston & Stoneman.

If one could but for an instant realise in thought the state of things that prevailed a few centuries ago, when books could only be disseminated by means of manuscript copies, only purchased at a great price, on account of their mode of production, and only read by the clergy, and a few particularly well-educated persons among all other classes, for they alone could read at all;—if we could but for an instant vividly realise that state of things, and all the accompanying circumstances that must have surrounded it, we should then be in a fit condition to appreciate as it deserves the greatest marvel of our time—the production of books for the actual people—the masses—in numbers proportioned to the myriads who thirst and hunger for intellectual food, and, with some serious exceptions, which we are happy to believe are daily lessening in importance, of a quality not unworthy of so grand an audience.

Look at this new competitor for public favour—this monthly serial, offering at the price, say, of an hour's labour, of the least required kind of labour, a comprehensive view of all that science has taught us up to the present time of Natural Philosophy. What would the illustrious Roger Bacon—the greatest philosopher of his, and a great one of any, time—what would not he have given to have obtained such a compendium of precious knowledge—such rich hoardings of time, learning, experiments, and skill, as Grandfather Whitehead here offers us for two-pence!

The form is novel. A slight biographical sketch,—partly real, partly imaginary—which shows the practical value of knowledge of this kind, commences the publication, and serves, subsequently, by the frequent reference made to it, as a kind of string upon which to hang the different Lessons. These present the chief materials of the little tract, in the form of questions and answers, and range over the entire subject, which is thus explained at the outset of the first Lesson:—

“1. *Teacher.*—WHAT is Natural Philosophy?

“*Pupil.*—It is that branch of the natural sciences which treats of phenomena that do not depend upon a change of the construction of bodies; and makes us acquainted with the nature, causes, properties, and effects of the various

objects and events which surround us. It will enable us to discover why a room smokes when there are two fires in it. Why the handles of cooking vessels are often made of wood. Why persons interpose a piece of woollen material between their hand and the handle of an iron kettle. Why plunging the hands into water produces a sensation of cold. Why water is fluid; or why a cracked bell makes a discordant sound.

“[The pupil should be required to give satisfactory answers to all these queries.]”

We append the biographical sketch referred to:—

THE STORY OF HALLAM, THE WEAVER'S BOY.

“Nearly a century and a half ago, great distress prevailed in a certain district in England, where there were but a few houses, peopled by labourers in the humblest condition of life: and, as the land was unproductive, and marshes hemmed in by mountains were to be seen far and wide, the earth did not bring forth sufficient to supply the wants of the people, so that many of them were obliged to leave the home of their childhood, and settle elsewhere. A poor lad, who had only received sufficient education to enable him to read, was removed from school to assist his father in his employment of stuff-weaving. The love of knowledge—the ardent desire of becoming a scholar—had taken possession of the youth, who devoted all his leisure moments, and even a portion of the time which his father required of him, to reading and writing. The father, instead of encouraging his son's fondness for study, forbade him to open a book, behaved with great harshness, and at length drove him from the house, telling him to go and seek his fortune where and how he chose. Weary, and uncertain where to go, he threw himself upon the heath to reflect upon the course he must take; and, having refreshed himself at an adjoining brook, walked to the neighbouring village, and took up his abode in the house of a tailor's widow, with whose son he had been previously acquainted. He contrived to support himself by industry and frugality, and to add to his stock of knowledge by careful observation and reading. Soon after his arrival, a pedlar, who combined fortune-teller and astrologer with his own trade, came to lodge in the same house; and becoming intimate with Hallam—for such was the boy's name—instructed him in the various branches of knowledge that he was acquainted with, while pursuing his own trade of pedlar and itinerant merchant. From the astrologer-pedlar, he obtained the knowledge of the first principles of Natural Philosophy; and his naturally active and intelligent mind, improved by reading, extracted new and important facts from the incidents of every-day life with which he was surrounded.

“The time for the departure of the pedlar arrived, and previous to setting off on his journey, he lent Hallam *Cocker's Arithmetic*, which had bound up with it a treatise on Algebra, and a work upon *Physics and Somatology*. These he studied so thoroughly, that when the pedlar returned he was astonished to find his quondam pupil had almost eclipsed his tutor, and forthwith proceeded to draw his horoscope, as he termed it, in order to discover the probable career of this wonderful lad.

"Having concluded his observations, the pedlar predicted that in two years Hallam would surpass his tutor, and ultimately rise to be a great man; and the youth promised that, if such came to pass, he would not forget in his prosperity, the instruction of the pedlar, and his kindness towards him.

* * * * *

"Eighteen years have elapsed, and the prediction has been fulfilled; the lad abandoned his trade of weaver, turned schoolmaster, and married his landlady—the tailor's widow. He has passed through many phases in his journey through life; and, notwithstanding the privations and hardships he encountered, has risen to a considerable eminence as a scholar, has been appointed Professor of Mathematics, and elected a Fellow of the Royal Society.

"The few houses that were scattered upon the borders of the wild and desolate district where Hallam's father formerly lived, have increased in number and size; the marshes have been drained, the land tilled, the mountains quarried, and the whole aspect changed from desolation to the busy hum of commercial activity. Jacquard-loom have been erected, mills and factories built, and long lines of streets; so that, from being a village at first, it has grown into a city. He seeks out the aged pedlar, who still instructs the young, and labours for his bread; the old man has almost forgotten his pupil, but tears of joy suffuse his eyes, as the remembrance of other days is recalled. At eve, the two stroll towards the brow of the hill, Hallam supporting his aged tutor, and as they approach a mill on the road-side, they halt, for the pedlar is wearied and wishes to rest himself.

"This spot," said Hallam, "is where I reclined when my father drove me from his house; but how changed the prospect! The mountain's side is now peopled; and where the heath and furze grew amid marshy land, the golden-eared corn bends to the breeze. Observe yon wagon as it moves along the road; 'tis mine—aye, and all the factories beyond! So you must now leave off toiling, and share them with me; for to your instruction I owe all."

"To mine?" replied the pedlar.

"Yes! 'twas through the knowledge obtained from you, that I have risen to my present position. Your prediction ever before me, and with the desire of reaching the highest pinnacle of fame and honour, I worked incessantly; success crowned my efforts; and now, surrounded with wealth and honours, I must not forget the pedlar-astrologer, and his gift-book of—NATURAL PHILOSOPHY."

The story thus pleasantly told is founded on the life of Simpson, the eminent mathematician.

We may observe in conclusion, that the plan embraces the following additional subjects:—

"2. Natural History—Principles of Classification; 3. Mechanics; 4. Chemistry; 5. Electricity, Optics, and Acoustics; 6. Pneumatics, Hydraulics, &c.; 7. Vegetable Physiology and Botany; 8. Animal Physiology and Anatomy; 9. Zoology; 10. Astronomy and Physical Geography; 11. Geology and Metallurgy; 12. The Applied Sciences

—Locomotion, Arts, Manufactures, Sanatory Improvements, &c., &c."

The whole will be completed in a single volume, within twelve months, for the price of half-a-crown. We need say no more to show to the readers of the *Family Tutor*, how valuable an acquisition is offered to them by "Grandfather Whitehead."

A Kiss for a Blow. London: C. Gilpin.

THE author of this work tells us that he one day visited a school in Philadelphia, and conversed with the children on the sweet spirit of peace, and the revengeful spirit of war. He tried to show them how much more pleasantly they could live together without fighting, and said he was about to publish a book for children on the subject of peace, and related some of the stories he intended to publish in it. As he was going away, several of the children came running after him, and said—"What name are you going to give your little book?"—He replied, "I hardly know what to call it. Suppose I should call it 'A Kiss for a Blow,' how would that do?"—"That is first-rate!" they cried, unanimously; and so that weighty point of authorship—the title—was settled. Could the author have submitted it to a better tribunal?

This little incident illustrates the playful, affectionate, and altogether Christian spirit of the compiler, Henry C. Wright, who further tells us that he dearly loves the company of children—that they have been the darling playmates and the sweet solace of his life—that he has so completely identified his life with theirs that he and they both forget when together that he is other than a child. "I am glad," he says, "the world is full of children. To me, earth, with all its other charms, were a gloomy waste without them." That all this is real we may be perfectly satisfied, when we learn that during fifteen years he has been an inmate of more than one thousand families, and has addressed more than fifty thousand children. Hence, the opportunities for collecting the stories that form the present volume, which are, with few exceptions, facts illustrative of the life and thoughts of children, and of the best modes of influencing them to love each other.

THE BIRD TALISMAN.

AN EASTERN TALE,

FOR THE TUTOR'S YOUNGER PUPILS.

THERE was once an old hermit, who lived in a hut near the source of the Ganges. He was very kind to all birds and beasts; and they were so accustomed to him that

the very wild beasts were neither afraid of him nor would hurt him. One day, as he sat by the stream watching two daws that were flying about and playing together in the air, one of the birds happened to fall into the water, which was very rapid, and was swept away by the stream, and would have been drowned if the old hermit had not run to its help, and, stepping into the



water, pulled out the daw with his hooked staff.

He laid the bird in the sun, and as soon as it was dry the two daws both flew away to a high rock, just above where the Ganges rises. The hermit saw them fly into a little cave, half way up the rock, and presently come out again, and fly back towards him; they alighted close to him, and one of them laid a ring down at his feet. He picked it up and put it on his finger, and he was immediately astonished to hear the daw speak to him and say, "Good hermit, please to accept this ring, for having saved my life, and for your kindness to all poor birds and beasts; it is a magic ring, and whoever wears it can understand the language of birds, and all birds will do whatever he orders them when he shows them the ring. Can we do anything to serve you?" The hermit answered, "Yes; I was formerly king of Cashmere, and was dethroned by my son-in-law, and obliged to conceal myself in this disguise. I should like, before I die, to hear some news of the queen—my daughter, and of my former kingdom; and if you can fly over the mountains to Cashmere, and bring me back some news, I shall be for ever thankful."

Away flew the two daws, and were out of sight in a moment, and for some days the hermit saw no more of them; but one evening, as he sat at the door of his hut, he saw two black specks in the sky, which, as they came nearer, turned out to be the two daws. They perched on the bench by his side, and one of them said, "We have brought you sorrowful news from Cashmere. The queen, your daughter, is dead, leaving one little daughter; and the king is married again; and, from what we heard from the parrot that belonged to the late queen, the present queen is very unkind to her step-daughter; and there is reason to fear that as soon as the king leaves his capital to go and hunt in the mountains, the wicked queen will take the opportunity to kill your little granddaughter, or get rid of her in some way."

The old hermit was very much grieved at this account, and could not sleep all night for thinking about it. In the morning, the two daws came, as usual, to fly about the banks of the stream; as soon as he saw them, he beckoned to them, and they flew to him. "Take this ring," said he, drawing the magic ring from his finger, "and carry it to my granddaughter, and tell her, when she wants help or advice, to

call to any bird she sees, and they will, no doubt, advise her and help her; it is the only help I can give her." "We will go to her," replied the daws, "and give her the ring; and we will stay with her, and do all we can for her, and, if possible, we will bring her to you."

Away flew the two birds with the ring, over the tops of the mountains, and across

the plains, till they came to the palace of the king of Cashmere. They flew straight to the chamber of the little princess, whom they found feeding her parrot; they laid down the ring before her, and she put it on her finger, and was immediately able to understand what the birds said, and to hold conversation with them.

The two daws told the little princess all



that the old hermit had told them, and the parrot told her all that had happened when her grandfather lost the kingdom. The poor little princess cried very much, and said she should be very glad to go to her grandfather, "for," said she, "the queen is so unkind to me, and never lets me see my father without being present, so that I dare not complain to him; and the queen sets everybody against me, and nobody loves me, or cares for me, except my dear old parrot." "My dear child," replied the parrot, stooping down from her perch to give her a kiss with her great horny bill—"you may always depend on my loving you as if you were my own child, and I had hatched you myself—for I was here when you were born, and your poor mother before you. As for what these worthy birds say about taking you to your grandfather, it will be a difficult and dangerous undertaking; but after the king goes on his hunting expedition to the mountains, it will not be safe for my dear child to remain here in the power of that wicked queen." It was then settled that the two daws should roost in the palace garden, and should be always within call, in case they should be wanted; and the

old parrot promised to keep a good watch in the palace, and find out whether the queen was planning any mischief against the princess.

Soon after this, the king set off on his grand hunting expedition to the mountains; and the very next day the two daws brought word to the parrot that the queen's favourite slave, Baboof, was busy gathering plants in the garden, and that they had seen him gather some hemlock, some henbane, some opium poppies, and several other poisonous plants. As soon as the parrot heard this, she flew out of the window, and having seen what Baboof was doing, flew straight to the queen's apartment, where she concealed herself, to watch the queen's proceedings. Presently Baboof brought in his bundle of poisonous herbs, and the queen chopped them up, and set them to boil in a pot, on a pan of charcoal that was burning in the chimney. She then took some flour and sweetmeats out of a box, and made a cake, and kneaded it up with the liquor from the poisonous herbs in the pot. She then set the cake to bake on the charcoal, and the parrot stole away without being perceived, and flew to the princess's apartment, where she

found the two daws. "There is no time to be lost," cried she; "if the princess stays here any longer, she will be poisoned. The queen is at this moment baking a poisoned cake for her. Come, my dear child, let us escape at once." The princess immediately rose in great alarm, and ran to the door, the three birds following her; but the door was locked. The window was too high above the ground for the princess to get out of it, and, besides, there was a sentinel in the garden, just opposite the window. Before they could determine what to do, the queen came, and unlocking the door, entered the room with a nice looking cake in a dish. She did not see the two daws, because they flew out of the window as the queen came in at the door. "Here is a cake for you, my dear," said the queen, "which I have made with my own hands;" and so saying she put it on the table, and went out, locking the door after her. As soon as she was gone, the parrot called the two daws, and told them to take the cake, and throw it over the garden-wall into the lake, which they did, and then came back. The princess remained locked

up all that day, and her usual meal was not brought to her; but the two daws gathered some figs for her in the garden, and she and her three birds made a very good supper of them. In the morning, the queen came to see whether the princess was dead, and when she saw her still alive, she was furious, and seizing her by the hair, began to beat her, and tried to get her hands round her neck to strangle her. In the mean time, the parrot flew out of the window straight to the queen's nursery, where the queen's little baby was in his cradle. The parrot picked up a lighted stick from a fire that was burning on the hearth, and set fire to the window-curtains, and then flew along the passages leading to the princess's apartment, screaming, "Fire!—Fire! The nursery is on fire!—the little prince will be burnt to death!" And all the slaves in the palace began to cry, "Fire!—Fire!" All this did not take two minutes; and the queen had not been able to strangle the princess, when she heard the outcry, and immediately leaving the princess lying on the floor, ran to the nursery to save her own child.



The little princess rose from the ground as well as she was able; and the parrot screaming to her that now was the time to escape, she ran out of the door and down stairs into the garden, where she was joined by the two daws, and the old parrot scuffled along before them and led the way to a little door in the wall. The princess with some difficulty drew back the bolt and opened the door; and going through this, they found themselves on the shore of the lake. There were two swans floating near the

shore, and the parrot told the little princess to show them the ring and order them to take her to the other side of the lake. As soon as the swans saw the ring which the princess held up to them, they swam towards her, bowing their heads and asking what she wished them to do. "Take me across the lake," said she. They immediately placed themselves side by side, and the princess, wading into the water, placed herself between them, with one arm over each of their backs; and so supporting herself,

almost up to the shoulders in the water, she floated between the swans, and they carried her safely over to the other side with the parrot sitting quite dry and comfortable on her shoulder, and the two daws flying overhead.

When they reached the other side, the princess landed, and the swans took leave of her, and swam back again. The princess found a retired place amongst the rocks, and taking off her clothes, spread them to dry in the sun; and the parrot told one of the daws to sit on the top of the rock and keep watch, while the other flew back at the princess's desire to see what had become of the queen's baby, and the nursery that was set on fire.

By the time the clothes were dry the daw came back, and told the princess that no harm had happened to the child, and that the fire was extinguished. He also said that the palace was in great confusion; Baboof and all the slaves running about everywhere looking for the princess, and that a reward of fifty pieces of gold was offered to whoever would bring her to the queen.

The parrot begged the princess to put on her clothes and follow her, for that they had a long way to go before they should be safe from their pursuers. So they all set out; the daws flying high in the air, and keeping a good look-out on every side, and the old parrot leading the way before the princess over the rocks. They soon reached a large wood; and while one of the daws flew high over the trees on the look-out, the other came down into the wood, and flew along the pathway in advance of the princess. They met several people in the wood; but the daw in advance always called out in the birds' language, and the princess hid herself in the bushes till the persons they met passed by. Nobody took any notice of the birds.

So they travelled on till the princess was quite tired out and hungry. The parrot then called down the daw that was flying overhead, and asked him whether he had seen any signs of water; and he said there was a little cascade falling from a rock not far to the right. The parrot told the two daws to see if they could find any fruit in the wood, and to bring it to the princess at the cascade; and then persuaded the princess to rise and follow her, tired as she was.

They soon heard the noise of the waterfall, and, guided by the sound, made their way to the foot of a rock, down which the water fell into a rocky and deep bason; here the princess drank her fill, and so did the parrot; and then they sat down on the grass to wait for the daws, who soon made their appearance with as many figs and grapes as they could carry. These were soon eaten by the princess and the parrot, and, as the daws had found them at no great distance, they were not long in bringing a fresh supply, and they all made a very hearty meal. The place was so pleasant and so retired, that they determined to rest there till the next day; and the birds busied themselves in collecting dry leaves and grass to make a bed for the princess, who soon learnt to make herself useful, too; and before night they had all collected a very comfortable heap of litter under a brow of the rock which kept off the falling dew. On this heap the princess lay down, and was soon fast asleep. The three birds went to roost in a tree close by, and took it in turns to keep watch all night.

In the morning, the whole party breakfasted on figs and grapes, and resumed their journey in the same order as the day before. Towards noon, and when they had been travelling on in silence for some time, the daw in advance saw a man coming to meet them, and immediately called out to warn the princess. She heard the cry of the daw, but could not understand what he said, but seeing him come flying back, and making a loud cawing, she thought something was wrong, and hid herself in the bushes till the man was past; she then rejoined the birds, but found she could not understand a word they said; at last she perceived that she had lost her magic ring, which being too large for her slender fingers, had slipped off, unperceived, in the course of the morning's walk; she held up her hands to show the parrot that the ring was gone; and great was the grief of all—the little girl crying, the parrot screaming, and the two daws cawing in mournful concert. At last the parrot made signs to the princess to follow her, and they all turned back the way they came, carefully looking for the lost ring, but in vain; for they reached the cascade without seeing anything of the ring.

(To be continued.)

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

2. *The Preliminary Education of the future Medical Student. (A Letter from an Old Medical Practitioner to a Schoolboy.)**

Now is your time to make yourself proficient in certain branches of literary and scientific education, the want of which you would feel powerfully from the very outset of your professional studies. Among these I would especially direct your attention to ancient and modern languages, arithmetic, mathematics, and natural philosophy. Nor are manual accomplishments to be forgotten. A surgeon ought to have a steady and a light hand, or rather he ought to have two such; he ought to be ambidexter. Make it an invariable rule, therefore, to keep your hands scrupulously clean, in order to preserve their delicacy of touch; and amuse your leisure with the use of various tools and implements, among others the pen and the pencil, which will give suppleness and power to your fingers, especially if you are always careful that whatever you do shall be well done. The art of drawing, besides affording you a delightful means of recreation, will be useful to you on a thousand occasions. Be particularly careful to cultivate accuracy and clearness of outline.

I need not insist on the utility of Latin and Greek; a sound knowledge of the former is indispensable, and of the latter highly desirable. To these languages you should add French, and if possible German, both of them classical languages as regards anatomy, physiology, and pathology. "Let no one ignorant of the mathematics enter here," was the legend inscribed above the entrance to Plato's academy. It were much to be wished that every incipient medical student should behold in his mind's eye a friendly prohibition, warning him back from the door of every medical school, until he had mastered, at least, the rudiments of Natural Philosophy. As the greater includes the less, that prohibition

would of course shut out the youth who was ignorant of arithmetic, algebra, and geometry, the primary instruments by which we arrive at a knowledge of physics. No long arguments are necessary to prove how requisite is that sort of knowledge, as a basis underlying the whole range of medical or vital science. The latter, as it concerns living bodies, which are built up of material elements, and are continually acted upon by outward things, manifestly presupposes an acquaintance with the constitution of those things, and the laws in accordance with which they act. How, for instance, can any one understand the wonderful structure of the eye, or have any notion of the physiology of vision, who is not familiar with the leading properties of light, and the laws of its refraction and reflection? What can any one learn from a lecture on the physiology of hearing, who has yet to learn the laws which regulate the production and transmission of sound? Apply yourself, therefore, in good time to the study of the laws of inanimate matter, if you would avoid endless perplexity and waste of labour when you come to investigate the more complex problems of vital science. Among the books in this department which you may consult with advantage, are *Arnett's Elements of Physics*; *Schodler's Book of Nature*; *Mrs. Somerville on the Physical Sciences*; *Herschel's Discourse on Natural Philosophy*; and some of the *Rudimentary Treatises* published by Mr. Weale.

In order to inspire you with a love for Natural History, I prescribe draughts, *ad libitum*, of *White's Natural History of Selborne*. It is a book that will not only fulfil the purpose I have mentioned, but will afford you most admirable examples of the art of observing—an art by no means so common as you may imagine.

When you have made some way in the study of physics, and have had some practical experience of the inductive method of philosophy, you will do well to direct your attention to the principles of the art of reasoning, as expounded in *Whately's Logic*, and in Mill's larger work on the same subject.

That you may the better digest these hints, I will not burthen you, at present, with more details. Only let me add this caution, that you are not to suppose that I

* This paper was intended to form the concluding portion of the one given in our last Number, but was unavoidably delayed. And now, but for the author's illness, the subject would have been completed.

would discountenance your prosecution of any studies which I have not expressly recommended. No man can know too much. All knowledge is precious. The more a man knows, the more his capacity for further knowledge increases. Beware, however, of desultory and superficial reading. It begets a slovenly and trashy habit of mind. Better know a few things well than have a smattering of many. Whatever you do, do thoroughly. *Age quod agis.*

LABOUR.

FROM THE FRENCH OF DEGERANDO.

WHEN it is considered that labour is the necessary condition of the great mass of mankind, that it occupies by far the largest portion of their existence, we are led to reflect closely and anxiously on a subject so ultimately connected with our destiny on the earth. At the first glance, every friend of humanity is penetrated with a feeling of sadness at witnessing the labour and fatigue which falls to the general lot, and in observing the monotony, and what seems absolute sterility, both for the mind and for the heart, in the occupations which cost so much in their operation: with surprise he asks himself, whether this being, whom he sees bent to the earth, or toiling in the factory, transforming a piece of inanimate matter, and differing little from a machine, is the immortal being whose origin he has thought so noble, and whose vocation he has conceived to be so high; he asks himself, with a feeling almost of affright, how such things can be reconciled with the dignity of our nature; how, for the great bulk of mankind, whom such a decree seems to condemn to a life altogether that of an animal, that career of moral and spiritual development which should be the privilege of all, can exist: if in those lofty ideas he had formed as to the designs of Providence in reference to man, he has not been the sport of pleasing but chimerical illusions. No! it is not so; he has not presumed too much as to the destination and the dignity of man, or of the hopes of elevation which are held out to him. Labour, rightly viewed, confirms these views, and by no means weakens or

destroys them. That man, here below, is everywhere in contact with material nature, is true; that he depends on it for the supply of his earliest wants, is also true; and that he is, in reference to his senses, submitted to its impressions, must be acknowledged. He must stoop to external nature; but he stoops to conquer. He stoops that he may subject and transform; that he may arm himself with the forces that exist in the air, the winds, and the waters; or, hidden in the bosom of the elements, to be used at his pleasure, and made the means of further conquests, and that he may raise on the earth that immense monument which the arts of civilization have constructed for the use of the race, and which will not soon pass away. The contemplation of such results, with all their vast relations, invests the idea of labour, even obscure individual labour, with a new character. But greater effects are yet produced. From out these riches—from out this general prosperity, which the progress of labour has brought about, spring new and more powerful influences. A crowd of moral effects spring up from the development which the social relations have received. The labours of many procure for some the leisure for fruitful meditation; these, in their turn, serve as moral and spiritual aliment to the multitude of laborious men, elaborating by nature's spiritual processes their amelioration and their happiness. So that, looking at the matter in a broad point of view, each by his labour, besides producing that which is necessary to physical existence merely, concurs indirectly in developing that vast amount of knowledge—placed beyond him, it may be—but in which in a hundred ways, he is a participator.

In the vast structure and progress of society, labour, then, is a matter of the highest importance. It is the great and universal lever of man's power over nature, and the source of all production, constituting the riches of the world. Viewed in the former light, labour, whatever character it may assume, is invested with nobility, for it becomes elevated to the dignity of virtue; it becomes the accomplishment of a universal duty, and a tribute to society to whom we are indebted for what we have, and for what we are. We are too much accustomed to look for virtue only in

actions of an extraordinary and brilliant nature, in things removed from common and every-day life. Let us wisely recognise it in the most ignoble and even vulgar occupation, where we know that such an occupation has entered into the wise designs of Providence, and forms part of the world's plan. Let us dare to think that it must form an essential part of our existence, as necessary as the air we breathe; and let not the prejudices of self-love step in to falsify and corrupt our conceptions of the true good. Yes! labour is a virtue. This thought tranquillizes and rejoices the heart of the truly wise. It is pre-eminently a good, and entirely changes the point of view under which human destiny is usually presented to us. Here, then, is a virtue which is the patrimony of all, the dowry of all classes of men, even the most obscure, the least favoured by fortune; a virtue which consecrates so many unknown laborious exercises, so little recompensed by the world, which often pays with disdain and contempt for these contributions to the general prosperity; a virtue which imprints a moral and spiritual character on occupations otherwise purely material; a virtue which attaches a real merit to actions which make up the entire tissue of our material existence, and which might have been demanded by necessity alone. It is true, such actions are necessary to our well-being, but yet they may be performed from motives which bear with them their own pleasures, and are charged with more frequent results. The miner himself, buried in the entrails of the earth, incessantly occupied in the merely mechanical and monotonous occupation of breaking up the rock that surrounds him, and who appears to be undergoing a punishment rather than exercising a branch of industrious labour, may animate and dignify his existence by a proper conception of the real nature of his task. A light purer than that light of which he is deprived may shine in his subterranean cavern. The heavy instrument that has fallen from his palsied hand he seizes with renewed courage, and even with joy, and exclaims, "I, also, can accomplish the divine law that has been imposed upon all creatures; for me, also, life is but a preparation for a higher destiny." This vast workshop, where so many silent and obscure labours are carried on, becomes converted into a tem-

ple; and a hymn of submission to the eternal decrees of Providence echoes along its vaults. Let man, then, raise with just pride the head now bowed to the earth, often watered by the sweat of his brow! Let not God's creature allow his courage to abate and his heart to wither. Is it not the work of creation that he is called upon to adorn and complete according to the designs of Almighty Wisdom? Is it not the vast edifice of society, whose creation requires his co-operation? How much gold is hidden under this gross mass of appearances! The victory that we acquire over external nature becomes the emblem and the image of a wise and sublime victory—the victory over our passions and the grossness of sense. The first will insensibly lead us to the second.

There is in labour a sort of moral mystery—a mystery grave and profound. Considered simply in its individual relations, it is a means of education, fundamental and necessary for each. A fixed and regular occupation is to man indispensable. It prevents those disorders into which he is usually thrown by impatience of action, joined to uncertainty as to its course; it relieves him from lassitude; it husband his strength, and prevents his energies from stagnating, from rambling, or destroying each other. Therefore, it preserves and sustains activity, by regulating it, and binding it to fixed occupations. Labour takes the senses captive, and submits them to a salutary regimen; it applies them to their just function; it shows that they are not solely instruments of pleasure, but also, and more especially, organs destined for action—instruments for useful production. It is a school for the exercise of sobriety and temperance; it foresees and tranquillizes the fervours of the imagination; dissipates vain conceits, and vague reveries; brings realities to light, and establishes the value of practical instruction. The application that is essential incessantly cultivates and strengthens the power of continuous attention, and generates habits of method, precision, and perseverance. It forces us to consider things in a spirit of order and sequence—a quality valuable in all our relations of life. Labour surrounds with protective dykes those nameless desires and wishes, whose unregulated impetuosity often over-

leaps the boundaries set by reason—it imprisons them, so to speak. Wisdom itself is indebted to labour; for, by its aid, moderation is preserved, and with it peace of mind, equilibrium of the faculties, and the health of the soul.

By the aid of labour, and the serious and regular habits which it engenders, man, then, is placed in a state of security. He is better defended against the ravages of passion, which is the vagabondage of the instincts. In it his weakness finds a refuge—his want of vigour a remedy. Incessantly constrained to the practice of self-control, habitually fighting with difficulties, submitting to privations—and of all privations, one of the most difficult to bear, viz., the deprivation of liberty—by these exercises he becomes daily strengthened, and strengthened in proportion to the difficulties he has to contend with; his will becomes robust, and, by patience, he gradually acquires that vigour which renders him capable of long and persevering efforts in all that he attempts.

Thus the labouring classes, with whatever disdain our prejudices lead us to regard their labours, usually possess a secret and silent pride which the world does not suspect, nor the superficial observer discover. It is, however, sufficiently known to those who may have obtained their confidence, and is not unfrequently accompanied by a secret contempt for those who, born in the midst of luxury, lead an idle and unproductive life. Labour is a school for resignation and contentment. It teaches us our dependence upon others, and the duty we owe towards them. It corrects and punishes our vanity, and is a long and continued commentary on the great truth that human life is a state of trial and preparation for another and a better. Of all sources of property, labour being the clearest and the most legitimate, he who is destined to a life of exertion, must comprehend clearly the respect due to property, and must, therefore, have a full conception of justice. He sees, in the more advantageous situations of life, the recompenses of labour. In general, the labouring man is the friend of order; for the order of society is instituted to protect the labour of each individual, and to insure to him the fruits of it.

In fulfilling this modest but continued duty, which, happily for us, we recognise

in labour, we acquire more just ideas of virtue, and conceive, hereby, its essential nature in its three principal relations: first, we practise it as a severe regimen, destined to restrict and repress our feelings of pride and ambition; secondly, we learn that it is far removed from the applause of the world in general; that it is not founded on mere *opinion, but is a living reality*; finally, we learn that it is no extraordinary thing, but general, equal, and constant; that it should occupy each day, each hour, each moment, and enter, as it were, into the very substance of our existence; that our souls ought to breathe it, as the lungs breathe the air that surrounds us, while the magnificent prerogative of our nature, viz. the power of consecrating our entire existence to duty, by submitting ourselves, voluntarily, and with enlightened reason, to the destiny which the Creator has marked out for us, is rendered sure and certain.

If, then, labour contributes directly, and in so many different ways, to one moral development, we may say that virtuous habits, in their turn, serve to render labour more easy and more productive; a truth which is not less important nor less gratifying—workmen who accompany their labour by song, work with ease and serenity. It is the same with the labour that is accompanied by the satisfaction of a good conscience. A secret melody goes along with it, and bestows upon it a yet greater charm. What man considers the fatigue of a journey, if the evening brings a sure remuneration, or the morning the commencement of a day of delight and pleasure? Virtue, then, adds her rewards to the small recompenses of the world, and holds out to us hopes of endless bliss. The burden becomes light when the heart is serene and content. The accomplishment of a good action is followed by greater strength—greater skill to accomplish, and greater will to attempt. The perseverance and method which labour demands, cost less to him who has chosen order and patience as a rule of life; and if this be true of simple mechanical operations, how much more so of the more important labours of the mind? Interest alone will counsel us to consider all labour as a duty, since by this adhesion to the will of Providence, we not only lessen the pain of labour, but render it more and more productive.

SOLUTION OF HISTORICAL ENIGMA,

Vol. ii., p. 90.

By MR. ISAAC ASHE, *Dulkalk*; and MISS CLEMENTINA GRANT, *Bishopwearmouth*.*

GENERAL ANSWER.

FIRST KING.—Edward II., who ruled over England and Wales, (and, nominally, over Scotland in the early part of his reign,) Ireland, Guienne, and Ponthieu.

DATE.—From July 7, 1307, to September 21, 1327, His two FAVOURITES.—Piers Gaveston and Hugh Le Despenser.

THE SEVERAL VICTIMS OF THE INFLUENCE OF THE FAVOURITES, AND THEIR FATE:—

King Edward II.—The victim of his love of "favouritism," in the persons of Gaveston and Despenser, (more especially the latter,) through the resentment and final rebellion of his nobles. Murdered in Berkeley Castle.

Walter de Langton, Bishop of Lichfield.—The Lord Treasurer. Deprived of his offices, together with the Chancellor and Barons of the Exchequer.

Twelve Knights.—Hanged in 1321, by order of the king, for their opposition to the two Despensers.

The Earl of Hereford, five knights, and three esquires.—Beheaded for their active protest against the king's favouritism, in 1322.

The Bishop of Exeter.—Torn to pieces by the mob in the streets of London, having taken part with the king and the Despensers.

The Earl of Arundel.—Related by marriage to the Despensers. Beheaded by order of the queen's partizans, for having sided against them.

Thomas, Earl of Lancaster.—Beheaded, in 1322, at Pontefract Castle, for insurrection against the power of Despenser, who also charged him "with many treasonable practices, especially with calling in the Scots."

Hugh Le Despenser the Elder.—Put to death by Queen Isabella, in hatred of his son.

Simon de Reding.—Confidential servant of Despenser the Younger. Hanged with his master.

John Le Marshal.—A wealthy citizen, murdered by the populace as a friend of the favourite, Despenser.

SECOND KING.—Ferdinand IV., who ruled over Castile, Leon, and Asturias.

DATE.—From 1295 to 1312.

HIS FAVOURITE.—Le Duc de Velasco.

THE VICTIMS OF HIS INFLUENCE, AND THEIR FATE.—The brothers, Don Juan and Don Pedro de Carvajal; unjustly charged with the murder of Don Juan Alphonso de Benavides, and thrown from their castle walls at Martos, by instigation of the Duc de Velasco, in order to further his designs on a lady, Donna Léonora Manriquez de Lara, betrothed to Don Pedro de Carvajal.

The death of Ferdinand may be attributed religiously, superstitiously, or poetically—(though not, in the strict sense, historically)—to the awful *summons* of the dying brothers. He died suddenly, in sleep, at Jaen.

POETICAL SOLUTION.

As morning mist upon the breeze upcurl'd,
Lifts its pale curtain from the waking world,
And to the traveller, wandering, ere it rose,
Far from his path, at length the pathway shows;
So from the face of yonder "hazy glass,"
The torch of knowledge bids the shadows pass;
The enigmatic vapours melt away,
And all grows radiant with historic day!

Lo! through the vista of the long-fled years,
A blood-red star yon "blood-stain'd page"
appears—

A record mark'd with many a hideous deed,
A record hideous to the heart to read!
Darken'd with regal crime, and darkest made
By the lost "two" o'er "distant lands" who
sway'd:

Whom Pleasure's voice made deaf to Sorrow's
moan,

Who raised their minions higher than the throne.

Minions ignoble, insolent, and vain,

Alike their countries' and their masters' bane;

Their suffering countries—each a very grave;

Their feeble masters—each a very slave;

Oh monarchs, sedulous alone in wrong,

In weakness constant, and in folly strong!

Stern justice smiles, yet sickens, to relate

Their kindred vices and their kindred fate;

Each in the flush of youth, and each with power

To make his people's love their sovereign's dower;

But each on minions raised all else above,

Heaping unkingly and unmanly love;

And dooming those they should have loved alone,

With delegated tyranny to groan!

Had Dante's bitter vision track'd their course

Through the dread realms of anguish and remorse,

(The penal realms his fearful genius drew,)

What taunting fiends had mock'd the regal two!

How crush'd Castile's fourth FERDINAND; and

how,

England! thy second EDWARD's plumeless brow.

England! my country—now with glory crown'd,

First on *thy* tyrant be the thorn-wreath bound—

First on the annals of *his* weak career,

Let scorn and pity drop their mutual tear,

Scorn for the throne, and pity for their bier!

Lo, in the flower of youth, and comeliest grace

That nature lavishes on form and face;

With gallant bearing and with courage high,

Joy on his lip, and laughter in his eye;

Rich in the legacy of warrior fame,

Bequeath'd him even in his sire's dread name,

(The very deed that glorious sire had won

Itself a pledge of glory for the son,)

Young EDWARD grasp'd the sceptre. Never yet

Rose lovelier day, more stormily to set;

Yet, in its first hour's travel from the east,

Some rays were lost, some gleams of promise

ceased.

How spoke the dying father? "On thy life,

Wage with the rebel Scot unceasing strife;

And that my soul may sleep of this assured,

And its last earthly craving be secured,

See! *my* dead limbs, I charge thee, and display

Their fleshless bones in front of thine array.

Till to the vengeful leopards in our shield,

The crouching kerns shall full obedience yield:

So shall the stubborn race be yet *my* slave,

And I *their* conqueror, even in the grave!

* The solution now published has been rendered complete by combining the answers of the two competitors; the late Editor having supplied a few historical deficiencies to the general answer.

Obey thou, too, another dread command—
Pluck forth my heart, and let a gallant band
 Of warriors bear it to the Holy Land;
 With gold pour'd bounteous from thy treasure-
 heaps,
 To deck the tomb where Christ, my Saviour, sleeps.
 Yet more—and mark this, too! my dying breath
 Binds on thy soul, with chains as strong as death—
 For all the treasures earth can show or hide,
 Recal not that base GAVESTON to thy side."
 —So spake the monarch terrible—and died! (1)

How heard the son?—he heard, as those who hear
 And tremble at a tempest raging near,
 But as it dies far off with feebl'er wail,
 Laugh at the lessening flash, the sinking gale:
 So the weak Edward heard, and so forgot.
 He waged *no* war upon the stubborn Scot: (2)
 He gave, despite that awful wish avow'd,
 His sire's dead limbs to sepulchre and shroud: (3)
 The pulseless heart its orient tomb he gave,
 But treasures *none* to deck the Saviour's grave.
 He lavish'd all in prodigal display,
 To strew with pomp returning Gaveston's way; (4)
 And, reason, duty, conscience, flung apart,
 Recall'd the minion to his throne and heart.
 Then rose the "mousing owl," (5) obscure and
 base,

And hawk'd at eagles in their "pride of place;"
 Then shrank the law, while swell'd the banquet-
 board;

Then fell the statesman, then the reveller soar'd;
 Then on the Patriot closed the dungeon-door;
 Then to the flatterer fell the good man's store;
 And he who traversed England's groaning land,
 Saw Gaveston's halls and bowers on every hand; (6)
 Till that "last drop," that makes the cup o'erbrin,
 The favourite's haughty madness pour'd for him.
 —But why recount what every child hath learned?
 The trampled nobles on their trampler turn'd,
 And stung the heel that on their necks had
 spurn'd;

And varying fortune mock'd her victim then,
 Banish'd, recall'd, and banish'd yet again;
 And yet again (despite the law's decree),
 Found basely clinging to his patron's knee!
 Till hate and vengeance, blindly, fiercely, cast
 Chivalrous faith and honour to the blast;
 And whom their knightly word was pledged to
 spare,

(Lost wretch! deluded from his castled lair,) (7)
 They doom'd—meek Pity vainly pleaded there.

(1) He died at Burgh-upon-Lands, July 7, 1307.

(2) "He marched as far north as Cumnock, on the borders of Ayrshire; but at that point he turned round, and made his way back to England, without having performed anything."—*Knight's Pictorial History of England*.

(3) "He buried his father's bones in Westminster Abbey."—*Ibid*.

(4) The date of the recal of this minion is August 6, 1307.

(5) "An eagle, towering in his pride of place,
 Was by a mousing owl hawk'd at, and kill'd."—*Macbeth*.

On the return of Gaveston, all the officers who had been appointed by the late king—the Chancellor, the Treasurer, the Barons of the Exchequer, and the Judges—were at once deprived of their places (to be given to the Favourite and his favourites), and, in some instances, stripped of their property, and thrown into prison.—See *Knight's Pictorial History of England*.

(6) "In travelling through England, nothing was so frequently seen as the manors, the retinues, and houses of this overgrown minion."—*Ibid*.

(7) "The king left Gaveston at Scarborough Castle, till he went from thence to York to endeavour to raise an army to return to his assistance. But, in the meantime, the

Vainly the victim dash'd him down, and craved
 Mercy from those whom he had scorn'd and
 braved, (8)

And mock'd with gibing names that now were
 thrown

Back from their burning hearts upon his own!
 The "hog," the "dog," the "player," and the
 "Jew,"

Nor mercy now nor knightly honour knew; (9)
 "Now, taste my fangs!" cried Ardenne's "sable
 dog;"

"Now, feel my tusks!" cried Lancaster's fierce
 "hog."

"Thy 'play' is o'er!" "Thy broken bond is due!"
 Sternly exclaimed the "Player" and the "Jew."

"Spare!" murmur'd one: "Yes! spare," cried
 others then,

"And free the fox to hunt him o'er again!" (10)
 He heard no more. Quick roll'd the "Flatterer's"
 head,

Where classic Avon laves its honour'd bed;
 Where Blacklow's knoll o'erlooks the placid tide;
 Low murmuring near, the wretched Gaveston
 died!

That tempest o'er, far north appear'd a cloud:
 The free-born Scot his free-born rights avow'd.
 The Bruce—immortal patriot!—rose, and broke,
 On glorious Bannockburn, (11) the tyrant's yoke.
 Fiercely and well the shafts of Freedom sped,
 And England's routed leopards yell'd and fled:
 Shame and despair sat heavy on her crest,
 And panic-terror seized on every breast.

Nay! the proud realm, once bravest of the brave,
 Show'd now the grovelling of a stricken slave:
 Insult, and wrong, and ravage tamely bore;
 And saw her "vengeful neighbours" sweeping o'er
 Her plunder'd fields, spoil-heap'd, from shore to
 shore;

When southward rush'd the dreaded Scot in wrath,
 And fire and slaughter track'd his awful path!

Died Edward's folly when his Gaveston died?

Lo, a new flatterer nestling at his side!
 With heart as weak he wreathes as mean a brow,
 And HUGH DE SPENCER is his Gaveston now.
 Then died Endurance: then the wrath and pride
 Of trampled England dash'd her sleep aside.

Favourite's retreat was laid siege to by the Baronial party, and Gaveston was compelled to surrender on capitulation to the Earl of Pembroke; who, with Lord Henry Percy, pledged his faith that no harm should happen to him."—*See the above History*.

(8) Gaveston, in derision, used to call the Earl of Lancaster "the old hog;" and "the stage-player;" the Earl of Pembroke "Joseph the Jew" (because he was pale and tall); and the Earl of Warwick "the black dog of Ardenne." When Warwick heard this, he vowed a terrible vow, that he would make the minion "feel the black dog's teeth!"—*Ibid*.

(9) "Pembroke, having (on pretence of visiting his Countess) left Gaveston at Dedington, the castle was surprised and taken by the Earl of Warwick, who then conveyed Gaveston to Warwick Castle, where a council was soon formed for his trial."—*Ibid*.

(10) "A suggestion was made that 'no blood should be shed;' but a voice rang through the hall—'You have caught the fox! if you let him go, you will have to hunt him again.' This death-note had its effect. The capitulation of Scarborough was foolishly disregarded; he was condemned to death. He threw himself at the feet of the 'old hog;' but there was no mercy there: they hurried him at once to Blacklow Hill, a mile or two from the castle; and there, in view of the beautiful windings of the placid river Avon, they struck off his head."—*Ibid*.

(11) This great battle was fought on June 25th, 1314.

In vain lost Edward arm'd and fought; in vain
 Revolted thousands died, or fled amain,
 When Boroughbridge was many a rebel's tomb,
 And their proud leader (12) had a felon's doom!
 That gleam illusive Fortune only threw
 To clothe her after-frowns with blacker hue:
 An outraged Queen forsook her falling lord, (13)
 And 'gainst him, with the banded nobles, warr'd;
 Till, routed, captived, prison'd, loathed, accursed,
 The second favourite perish'd like the first! (14)
 Then, of each *meaner* victim weary grown,
 Stern Ruin claim'd the hapless KING her own!
 By wife and child unwept, lost Edward fell,
 And sacrilegious Horror peal'd his knell;
 When shrieks were heard "through Berkeley's
 towers to ring—
 Shrieks of a murder'd, agonized King!" (15)

Oh! drop the curtain, change the fearful scene;
 Let oceans roll, and mountains rise between!

Another realm the mental vision sees,
 Beyond the parting wave and Pyrenees;
 Another monarch, on whose early days
 The sun of glory shed its morning rays,
 When, by his youthful valour's bright avail, (16)
 "Red gleam'd the Cross, and waned the Crescent
 pale!"

And the swart Moor was sternly doom'd to feel
 The conquering rage of Leon and Castile.

Oh thou, once greatest of the great, fair SPAIN!
 Land of proud mountain and of fertile plain—
 Land of the hero's pride, the minstrel's strain,
 And "dark-eyed" beauties, whose too fatal charms
 Arm'd their fierce lovers with assassin arms!
 Still Nature smiles where Freedom smiles no more,
 Still with rich vines thy hills are trellised o'er,
 (Hills crimson'd oft by vintages of gore!)
 Still are thy forests vast; thy vales elate
 With clustering orange and with grateful date;
 With almond, olive, and pomegranate stored,
 And the sweet wealth of melon and of gourd.
 There spreads the cactus; there the silk-worm
 toils,
 To clothe the plunderer, man, in glossy spoils;
 And there the insect (17) breeds, whose hues of fire
 Make prouder yet that proudest of attire;

(12) Thomas, Earl of Lancaster, defeated at the Battle of Boroughbridge, and beheaded, March 18th, 1322.

(13) Enraged at the influence of the Despencers, Isabella, Edward's queen, raised a little army in Holland (at Dort), composed of the Lancastrian malcontents; and with these, and her son, Prince Edward (to whom all men looked up) landed at Orwell, in Suffolk, on September 4, 1326, after a stormy passage. The troops were headed by Roger Mortimer, who was received as the deliverer of the kingdom.

(14) Wife, son, brothers, cousins—all being in hostile array against Edward, he fled into Wales, accompanied by his favourite, Despenser, who was soon after seized in the woods of Lantressan, and, by the orders of the queen, executed in 1327.

(15) The king concealed himself for some time in the mountains of Glamorganshire, but, immediately after Despenser's arrest, helpless and hopeless he gave himself up to his pursuers, and was confined in Kenilworth Castle, where a formal resignation was forced from him, January 20, 1327, and his son Edward declared king. Edward II. was finally lodged in Berkeley Castle, where he was cruelly murdered by his keepers, Sept. 21, 1327.

(16) The young monarch, Ferdinand IV., attacked Gibraltar, and took it from the Moors.

(17) The Cochineal insect. It yields a splendid crimson and scarlet dye, and is also used in the preparation of carmine.

And when youth's flown, or health's pure rose is weak;

Gives its false bloom to fading beauty's cheek.
 All wealth thy favour'd land is bless'd to know,
 Tree, plant, and flower, above; and richest ores
 below.

On high, Merino's peerless flocks are fed; (18)
 Far down, bright treasures sleep,—gold, silver,
 lead;

And o'er thy rocks Rocella's lichen grows, (19)
 That testing power on chemic art bestows.
 All that can cherish, soothe, make glad or fair,
 On earth's rich breast, or in its depths, are there;
 And prouder gifts, fair Spain, were thine of yore,
 When the fourth FERDINAND thy sceptre bore;
 But he, like England's wretched Edward, gave
 His heart to flattering parasites a slave;
 Lavish'd his smiles on *them*—to all beside
 A tyrant, insolent in wrath and pride.

Lo! upon *one*, nor good nor truly great,
 Was heap'd all honour, wealth, and power, and
 state;

VELASCO's Duke that ill renown must claim,
 Whose haughty rank but aggravates his shame;
 As lamps but show the darkness of the night,
 So crime looks blacker shown by honour's light!
 And lo, in virtue's fair contrasted bloom,
 Two BROTHERS, destined to a timeless tomb,
 The timeless victims of a groundless hate—
 But dark in theirs was wrapt their murderer's
 fate.

Generous and good, affectionate and true,
 The brave CARVAJALS up to manhood grew,
 And, midst the roar of battle's mortal strife,
 Perill'd their own, to save KING SANCHO's
 life: (20)

But in the heart of one a passion deep,
 Sow'd the dread harvest death alone should reap;
 He loved: alas! full many a tale can show,
 How "sweet affection proves the spring of woe!"
 Fair was his LEONOR—too dearly fair—
 The courtly minion threw his glances there;
 Met cold repulse, and mark'd on whom *her* gaze
 Fell with the softness that the heart betrays.
 Oh, soil of hell! the heart wherein is sown,
 Hatred and envy's poison plants alone!
 Rankly in that all-evil heart they grew,
 And o'er the guiltless deadliest venom threw.

To sweep his rival, PEDRO, from his path,
 He forged a tale that woke the monarch's wrath,
 And swept *both* brothers darkly to the tomb;
 "Murder" the charge, and "instant death" the
 doom!

"Avenge, oh king!"—the artful favourite said—
 "The blood of BENAVIDES on their head:
 A peaceful chamber in Valencia's hall
 Beneath their murderous weapons saw him fall—
 Him, thy brave vassal—noble, just, and true—
 Him, the Carvajals in their fury slew!
 Now, in thy *righteous* fury, do as they;
 Blood cries for blood, and blood for blood should
 pay."

—He spoke. The raging sovereign, with his powers
 Sped like the winds to where the brothers' towers
 Look'd over Martos, from their craggy base;
 And there the indignant couple, face to face,

(18) The Merino breed of sheep is pre-eminent for the fineness of its wool.

(19) *Litmus*, a preparation from the *Lichen rocella*, is used as a test for acids and alkalis.

(20) Sancho IV. was the father of Ferdinand IV.

Met their accuser and their judge, and flung
The charge of horror back to whence it sprung:
In vain! as well unto the raging blast,
When storms are loudest, might their words be
cast!

For the fierce king nor heard, nor thought, nor
saw,

Deaf rage his justice, blind revenge his law!
"Death to the murderers!" was his reckless cry,
The ministers of doom stood ready by,
Listening with greedy ears, and, at the word,
Savagely seized and (all untried, unheard),
Hurl'd the brave brothers from their castle's
crown,

O'er rock and rampart, far, far plunging down.
Yet, for one dreadful instant (such a space
As heaven accorded in its awful grace,)
Ere hurl'd below, aloud the brothers spoke,
And from their lips the words like lightnings
broke—

"Oh king, who sittest on a throne accurst,
Oh judge, that know'st not justice, wreak thy
worst;

But *ere* thy worst thy slaves or thee can wreak,
These words, with death's prophetic voice we
speak.

We summon thee, by all of wrath and crime,
That blot the annals of thy earthly time—
By all of sin, or acted or desired,
Thy bosom-fiend hath prompted and inspired;
And last, and chiefest, by the deed of shame,
That brands to-day thy trebly-branded name—
Ere thirty days have ceased their light to throw
Upon the sod that drinks our blood below—
Ere thirty nights have dew'd that crimson sod,
To MEET US AT THE JUDGMENT-SEAT OF GOD!"

They spoke, and there was silence all around,
Like that before an earthquake heaves the ground;
Then dash'd and roll'd both bodies o'er and o'er,
Down the steep rocks, all shapelessness and gore.

Leave we the good and brave to mourn their loss,
Again the Crescent glares against the Cross!
Hark to the cymbal in the Moorish camp—
Hark to the hurrying Christian's martial tramp:
There rides the proud Castilian monarch now—
Why with that cold sick pallor on his brow?
Lo, Alcandeta with its rock-bound crest;
But let who will its summon'd towers invest.

A *summon'd king* hath sped to peaceful JAEN (21)
For rest and sleep—nor thither sped in vain.
He slept ere noon—it was the *thirtieth day*
Since the Carvájals' spirits soar'd away;
He slept ere noon—hours fled, and yet he slept,
And wondering watch his silent menials kept;
He slept at eve—they listen'd for his breath,
It was the deep and dreamless sleep of DEATH;
And awe-struck Spain, in memory of his doom,
Carved the dread words, "THE SUMMONED," on
his tomb!

(21) After the death of the Carvájals, the king set out for the camp then pitched against the Moors at Alcandeta in the mountains. But feeling indisposed, he retired to Jaen, where, during recovery, having one day taken refreshments and fallen asleep, he was found dead by the domestics who came to waken him. As this visitation took place on the thirtieth day from the death of the two brothers, it was naturally regarded as the fulfilment of their prophetic summons, and he has therefore been termed by the Spanish historians *El Emplazado*, or "The Summoned." For all the particulars of this monarch's reign and death, see the *Biographie Universelle*, vol. xiv.; and Marianne's *Histoire d'Espagne*, vol. xiv.

A LESSON IN TEACHING.

M.—What English word is derived from the Latin word *ars*?

P.—Art.

M.—What part of speech is art, and what does it mean?

P.—A noun, meaning *skill*.

M.—Has it any other meaning?

P.—Yes, *cunning*.

M.—How does one meaning differ from the other?

P.—*Cunning* is generally taken in a bad sense, signifying *low art, mean shifts, petty deceit*.

M.—What word derived from *ars* comes nearest to *cunning*, in its bad sense?

P.—Artifice.

M.—What personal nouns are derived from *art* and *artifice*?

P.—Artist or artificer.

M.—Distinguish between these.

P.—An *artist* is the practiser or professor of a manual trade or calling, which exhibits elegant contrivance or scientific ingenuity; thus, a painter, a sculptor, and an optician, are artists. An *artificer* implies a manufacturer, or a constructor of edifices; and it sometimes even approaches the term of artisan.

M.—Could you with propriety call a man the artist or artisan of his own fortune?

P.—No; but I could say that he was the *artificer* of his own fortune; for artificer has some reference to foundation or structure, which is not suggested by the term artist.

M.—In what respect does *artificer* approach to *artisan*?

P.—An artisan is properly a *tradesman handicraftsman*; and certain tradesmen, such as carpenters, masons, and shipwrights, may be denominated artificers. The terms, therefore, approach, when employed to designate like classes of persons.

M.—Can you think of any word to describe one who is deeply or habitually cunning?

P.—Yes; I would call him *crafty*.

M.—Have you forgotten what *artful* is derived from?

P.—No; from art, which is itself from the Latin *ars*.

M.—Which of these is the root?

P.—Either may be regarded as such ; but the mere English scholar would recognise *art* alone.

M.—What adjective from this root signifies *simple*, or *void of guile* ?

P.—Artless.

M.—What is the corresponding noun ?

P.—Artlessness.

M.—That is not in Johnson.

P.—Oh, I did not know ; but it is in my book. I think *artlessness* as allowable as thoughtfulness, needlessness, shamelessness, uselessness, joylessness, and all such.

M.—So indeed it is. I must observe, however, that *joylessness* is not to be met in Johnson ; neither is *guilelessness*, a word of similar import with artlessness, nor *gracelessness*. I have directed your attention to these minute matters, with a view of finally informing you, that you have need of perpetual vigilance, if you aim at purity ; of indefatigable research, if you seek correctness ; and of a becoming respect for authority, if, instead of wandering with chance, you hope to advance with certainty. Many derivations of the form we have been considering are inharmonious, and may have no nicety of acception to make them necessary or useful. Some are to be rejected for more agreeable substitutes from the same roots—thus, *ungracefulness* is preferable to *gracelessness*, when speaking of a person's address ; while others should be rejected for words of a different origin altogether : thus *gentleness* would be better expressed by *innocence*. What may supersede artlessness ?

P.—Unartfulness.

M.—No. We have the negative, *unartful*, but not the name you have formed from it. Perhaps it does not occur in any of our authors. It may be defended but it will not be used till we have entirely forgotten *simplicity*. To much that learning has coined, taste has wisely denied currency. Have *artful* and *artless* corresponding adverbs ?

P.—Yes ; *artful* and *artlessly*.

M.—Have you any more synonymous adjectives for *artful* ?

P.—Yes ; sly, insidious, dexterous.

M.—What noun corresponds with dexterous ?

P.—Dexterity.

M.—Is dexterity generally taken in a bad sense ?

P.—No ; its meaning is influenced by the context, or is to be derived from the general tenor of the sentence. *Dexterity* usually means cleverness, or ready skill in the execution of any work, or the conduct of any undertaking. Dr. YOUNG.

GALILEO'S DEFENCE.

[The following extract from a letter of Galileo to Madama Cristina, Granduchessa Madre, just published by Liebig, in his admirable *Letters on Chemistry*, will, we have no doubt, be as novel and interesting to our readers as it is to us.]

WE bring forward that which is new, not to confuse nature nor the minds of men, but to enlighten them ; not to destroy science, but to give it a true foundation. But our opponents call false and heretical that which they cannot refute, making for themselves a shield of simulated zeal for religion, and degrading the Holy Scriptures into the instrument of private ends. But a writer ought not to be condemned unheard, when he treats, not of ecclesiastical, but of natural things, and does so with the aid of reasons derived from astronomy and geometry. He who would hold in all cases to the naked grammatical sense, must needs accuse the Bible of contradictions—nay, of blasphemies—when it speaks of God's eye, his hand, or his anger ; and if this takes place in the apprehension of the people, how much the more ought we to regard it in matters which are remote from the observation of the many, and do not affect our salvation, as the natural sciences. For these, therefore, we must not begin with the authority of the Bible, but with the observations of our senses, and the necessary proofs ; because nature and the Bible alike owe their existence to God. As the Bible, to accommodate itself to the ignorance of man, says many things figuratively, while nature, immutable and inexorable, never steps beyond the letter of her laws, not caring whether her concealed causes and modes of action be adapted to the comprehensions of men, it appears that that which observation and evidence bring before our eyes and intellects, ought by no means to be brought into doubt by texts of Scripture, which have a double sense, because each word is not bound by such strict rules as are

natural phenomena, and God reveals himself in the latter not less gloriously than in the words of the Bible. Before all things, therefore, in science we must make sure of facts. To these the Bible cannot be opposed, else would God contradict himself; we must consequently expound their sense accordingly, and the capacity of making such researches is also a gift from God. For astronomy we have received strength and understanding; but the Bible, in this respect, speaks as the people then regarded the matter, for the people were not to be alarmed, and if the Bible had given rest to the sun, and motion to the earth, the feeble understanding of the people would have been confused, and they would have become perverse and obstinate in the belief of the principles of religion. But where has the Bible condemned the new doctrine? The Holy Spirit has been silent on this head, and if, therefore, our views have nothing to do with our salvation, how can they be heretical? The Holy Spirit has taught how we are to reach heaven—not how heaven moves. It is setting the reputation of the Bible on a hazard, to view the matter otherwise, and, as our opponents do, instead of expounding Scripture according to facts surely proved, rather to force nature, to deny experiment, to despise the intellect. Neither is it any rash or reckless thing if any man should not adhere to antiquity; but to found geometry on the Bible shows a false notion of its supreme dignity, as absurd as it would be for a king, because he is a king, to insist on being physician and architect to his subjects, and force them to use his prescriptions.

It is not in the power of the man of science to alter his opinions, to turn them this way and that; he cannot be commanded; he must be convinced. To cause our doctrine to disappear from the world, it is not enough to shut the mouth of a man, as those imagine, who measure the judgment of others by their own. It would be necessary, not merely to prohibit a book, and the writings of the adherents of the doctrine, but to prohibit all science; to forbid men to look towards the heavens, in order that they should see nothing that does not fit with the old system, while it is explained by the new. It is a crime against truth, when men seek the more to suppress her,

the more clearly and openly she shows herself; but to condemn one opinion and leave the rest standing, would be still worse; for it would give men the chance of seeing an opinion proved to be true, which has been condemned as false. But to forbid science itself, would be against the Bible, which teaches in a hundred places, how the greatness and glory of God are wonderfully seen in all His works, and are to be read in their full divinity in the open book of the heavens. And let none believe that we have completed the reading of the sublime thoughts which stand written in characters of light on those pages, where we have gazed at the brightness of the sun and stars at their rising and setting, which, indeed, the beasts also can do; but there are therein mysteries so profound, ideas so sublime, that the nightly labours, the observation, the studies of hundreds of the acutest minds, after a thousand years of research, have not yet fully penetrated them, but the pleasure of investigation and discovery endures eternally.—*From M. Carrière's Weltanschauung.*

SCIENTIFIC FACTS.

VITAL HEAT OF PLANTS.—M. Dutrochet has shown, by means of his thermoelectric machine, that every plant not only possesses a heat of its own, but that such heat, subject to a daily impulse, attains its maximum about the middle of the day, and presents its minimum during the night. The hour of the maximum varies in different plants, from 10 A.M. to 3 P.M.

THE REPUBLIC OF SCIENCE.—The sciences, like those who cultivate them, enjoy this happy privilege, that, in regard to them, there exist no national antipathies, nor even those kinds of intellectual frontiers which, under the influence of languages, become established between the literature of different nations. They form a true republic, whose peace nothing should ever disturb, and where merit alone leads to distinction, for the conferring of which there need no formal resolves, nor protecting regulations. The respect given to talent, like the esteem accorded to virtue, is so inherent in our nature, that it is not in our power to refuse it when it is really deserved.

12—Douglas. J.—The author of this tragedy was a minister of the Church of Scotland, named Home.

13—Lenses, &c. J.—We know of no better means of learning the rudiments of the manufacture of lenses and optical instruments than by paying a visit to the London Polytechnic Institution. Quekett's work, and Pritchard's *Micrographia* are the best volumes on the microscope, &c., but these do not teach the details of the preparation of glasses.

14—Metempsychosis. M. A.—The notion of transmigration of souls existed long before the time of Pythagoras. Herodotus mentions it as a part of the teaching of the Egyptian priests. The doctrine is still held by the people of Arracan, Peru, Siam, Cambogia, Tonquin, Cochinchina, Japan, Java, Ceylon, and some of the South Sea Islands. The Druids believed in transmigration. The Welsh triads are full of allusions to it. The ancient Mexicans accepted it; and it prevails in many of the superstitions of the American Indians.

15—Vicar of Bray. R. E.—There is some difference of opinion as to the locality of the vicarage in question; it was in Berkshire, according to some, in Ireland, according to others. The vivacious and reverend hero of the distich was a papist under Henry VIII., a protestant under Edward VI., a papist again under Mary, and a protestant again under Elizabeth. When accused of inconsistency, he replied, that he had always been true to the Church of England, and to his principle, which was "to live and die the Vicar of Bray." He was only one of a very large number of persons who acted in a similar manner during the same period.

16—Wax-work. J. H. W.—Wax-work can never have equal claims with sculpture, for reasons which we have not space here to explain, further than by saying, that art is not a mere imitation of nature, but something far higher. The wax-work imitates, but the sculpture elevates the idea of the modeller. The first series of anatomical models was prepared by Fontana, under the patronage of the Grand Duke of Tuscany. A beautiful specimen of wax-work is described by Menage, as having been presented to the Duke of Maine in 1675. Madame Tussaud's is now considered the most perfect collection in the world.

17—Menulcas, or the Absent Man. A. C.—This character, which our correspondent thinks "has a greater aspect of reality than many of the other literary portraits in the *Spectator*," is translated from Bruyere, and is a portrait from life in the original, where many other very curious anecdotes are related. The real name of the subject of the curious memoir was Count de Brancas, who was a cotemporary of Bruyere. La Fontaine is said to have been so singularly absent, that a few weeks after having attended the funeral of a friend he called to visit him! At first he was shocked at the information of his friend's death, but recovering from his surprise, observed—"True! true! I recollect I went to his funeral."

18—Godfrey de Bouillon. H. W. F.—The statue in the Great Exhibition was criticised at some length in the *Illustrated London News*, to which we refer our correspondent for the history of the work and of the sculptor. H. W. F. will find in Longerne's translation of the *Arabic Chronicle*, some notice of the hero represented; but a more copious and laudatory, but less veracious,

celebration of him is to be found in Tasso's *Jerusalem Delivered*. A neat edition of the English translation of the latter appeared in Knight's *Weekly Volume*. There is good reason to believe that the Count de St. Gilles was a more distinguished character than the vaunted Godfrey. In the *Arabic Chronicle* there is some curious information about the Crusades. It is written in a spirit of great fairness to the "Christian" combatants.

19—Pasquin and Marforio. J. T.—The statue of Pasquin was found under the shop of a satirical tailor of the name; during whose life, continual streams of satirical lampoons flowed through Rome from his shop. After his death, the statue—which is of marble, but much mutilated, was called by his name. Marforio is an ancient statue of Mars, found in the Forum—the name of which has been corrupted by the common people, into *Marforio*. To one or other of these statues were affixed those satires or lampoons, which the authors wished should be dispersed throughout Rome, without any danger to themselves. The attack was fixed to the one statue, and the respondent lampoon to the other. [See Misson's *Travels in Italy*.] We suppose that the reign of Pasquin and Marforio has long since terminated under the military despotism now prevailing in Rome.

20—Solomon and the Bees. H. R. L.—The story is alluded to in Miss Edgeworth's *Practical Education*, where an ingenious story is founded upon it. The original is to be found in the *Talmud*, where it reads as a pretty poetical tale. The incident, without its literary embroidery, is as follows:—The power and wisdom of the monarch, Solomon, having extended to the remotest parts of the known world, Queen Sheba was attracted to the court, and determined to test the sagacity of the monarch. On presenting herself, she held in each hand a bunch of flowers, one real and the other artificial. At the distance at which she stood, it was impossible by the eye to discover the difference between them. The monarch seemed puzzled for a moment, but immediately availed himself of an expedient worthy of a naturalist. Observing a cluster of bees hovering about a window, he commanded that it should be opened: the bees rushed immediately into the court, and alighted on the real flowers, avoiding the artificial.

21—Etiquette. H. M., and L. R.—It is true that the formalities of society are, in some cases, oppressive, but they will be found, in a large number of instances, to have arisen from circumstances which justified the imposition of the regulations by society. If they had no uses they would be abandoned. We hold that many "customs are more honoured in the breach than the observance;" of this we could quote many examples. An amusing anecdote is related of a Spanish king, who, rather than compromise his dignity by rising from his fireside, was roasted into a fever, which terminated mortally. It was contrary to etiquette for servants to enter the apartment, and the personage whose duty it was to damp the fire was out, so the heat of the fire could not be lessened. A soldier, who entered the palace to rescue a princess from fire, was actually brought to trial for the offence! There are many cases equally absurd in our own conventionalisms, if we had the eye to see them; but conventionality is not politeness. The error of confounding the two has led to the

debate between our correspondents, both of whom are right to a certain extent.

22—Singular Burials. P. T.—Our correspondent, alluding to the discovery of skeletons at Cambridge, mentions what he supposes to be curious indications of the disturbance of the tombs upon some previous occasion, before their recent discovery. If the remains be those of powerful warriors, as appears likely, this may be a true supposition; it is confirmed, rather than contradicted, by the fact that there were no surface indications of the place of burial. As an example of early customs in this respect, we might note the account given of the burial of Attila, the king of the Huns, who was interred in the middle of a vast plain, in a coffin cased with the precious metals. With his body were interred vast spoils of the enemy, harnesses embroidered with gold, and embossed with jewels; and that the place where all this treasure was deposited should remain unknown, the Huns deprived of life all those who assisted at the burial. The Goths had previously done the same for their king, Alaric, in 410. They turned aside the river Vaso, where its course was most rapid; they interred the body with a vast accumulation of riches; they then caused the river to resume its course, and murdered without exception all those who had been concerned in digging this singular grave.

23—Feudal Institutions. R. C.—We cannot join in the outcry against feudal institutions, inasmuch as, although they were fraught with much evil, they appear to have been adapted to the times, and to have organized society by recognising the interest of the many in protecting the property of the few. The northern nations, in their irruptions into Europe, were barbarians, independent of each other, till a sense of public safety induced them to confederate. The individual lost his wild liberty in the subjugation to society; and in the first attempts at the formation of social institutions we observe the original ferocity showing itself as impatient of constraint, and often ready to commit injustice where it possessed the power. The power of the lords was, however, shaken (as despotic power always will be opposed) by commerce; and the freedom of cities originating in mercantile pursuits set the power of feudal barons at defiance. [See *Robertson's Introduction to the History of Charles V.*] Personal slavery of the serfs was a part of feudalism, and its customs with reference to the marriage of persons living on the estate were execrable. Arising out of a barbarous feudal custom was the circumstance which occurred at Coventry, and which has been historically preserved in the tale of *The Lady Godiva*. Feudalism still exists in Russia. [See Hallam's *State of Europe in the Middle Ages*.]

24—Gaming. H. C.—There is no analogy between the calculations based on ascertained laws, and the hazarding of money upon contingencies, the probabilities of which are unknown. The latter is gambling; the former is commercial philosophy. A bet upon "the throw of dice" is an illustration of the one; while a guarantee against loss from a particular accident, whose time of recurrence can be calculated, is a specimen of the other. [See *Quetelet on Man and on Probabilities*.] That everything which happens is obedient to law, and occurs with some regularity, is apparent from the fact, that each year the number, proportioned to the number travelling, of persons

injured and killed by railway accidents is nearly the same. Of 800 houses, on an average, one is burned every year. Out of 10,000 persons, of the age of 52, one hundred and fifty will die next year. On any particular day, the number of rain-drops falling at a given place, on an average of eighteen years, is the same as the average of any other eighteen years. Gaming, however, is a universal passion—its prevalence indicating the ignorance and superstition of the country with reference to the external laws of the material universe. There is an elaborate treatise on the subject by Barbeyrac, and a work in two volumes by C. Moore, on gaming and its *sequelæ*—suicide and duelling. Duelling and gaming are closely akin in their nature, and commend themselves to the same minds. The laws against both appear to have been unsuccessful, for we learn that in Japan, where gambling is punishable by death, the people are continually engaging in "games of chance." In the time of Shakspeare and Jonson, "gamester" and "cheater" were synonymous, and they have hardly lost much of their significance at the present day.

25—The Inquisition. P. L. S.—Pope Innocent III. having sent Dominic with some missionaries into Languedoc, these men so irritated the heretics they were sent to convert, that most of them were assassinated at Toulouse, in the year 1200. He called in the aid of temporal arms, and published against them a crusade, granting, as was usual with the popes on such occasions, all kinds of indulgences and pardons to those who should arm against his opponents, whom he termed "Mahometans." At this period, it would appear that every one who was not a Roman Catholic was considered a Turk. Raymond, Count of Toulouse, was compelled to submit, and the inhabitants were passed on the edge of the sword without distinction of age or sex. It was then that the Inquisition was established. It was intended as a means of inquiry only in the outset, but the completeness of the organization, and the plenty of instruments, led to an extension of its plans to hold trials, inflict torture, and sentence to death under the most dreadful circumstances. The Inquisition was not known in Spain till 1484, where it was introduced by a Dominican, named John de Torquemada, confessor to Queen Isabella, through whose influence the tribunal was established in that country. In fourteen years, Torquemada prosecuted nearly eighty thousand persons, of whom six thousand were condemned to the flames. Voltaire, with some show of truth, has attributed the taciturnity of the Spaniards to the continual dread in which they lived during three generations. We remember to have read the description somewhere of the tomb of a great inquisitor in the Cathedral at Saragossa. Six pillars surround the tomb, to each of which is chained a heretic, ready to be burned. On this a French writer observed, that it would serve, hereafter, as a model for a tomb when hangmen should be heroes. The punishment by fire was chosen to evade the maxim, "*Ecclesia non novit sanguinem*." The establishment of the Inquisition was resisted in France; but Sir John Howell, the recorder of London, recommended its establishment in England, in 1670. *The History of the Inquisition*, by Limborch, translated by Chandler, will afford further information to those who wish to pursue the subject.

POPULAR GEOLOGY.

CHAPTER III.—THE MEANS OF GEOLOGICAL STUDY: FOSSILS.

Meaning of Fossilization.—By fossilization we mean the study of those relics of vegetables and animals which are found in stratified rocks, and which only cease to appear as we delve down towards the granite.

State of Preservation in which Fossils are found.—Fossils are found in varying states of preservation, of modification, and of almost entire change. They are often broken—a fact that may be ascribed to the turbulence of the actions which accompanied their original inhumation; and often worn, by long rolling, against hard surrounding substances. Certain portions, again, of a fossil, will decay, while the rest remains uninjured. The pieces of bivalve shells are thus often discovered apart, through the decay of the hinge ligaments. Mechanical compression produces peculiar effects, as may be witnessed in the compressed ammonites found at Watchet and other places, in the goniatites and pectens of Bradford, in Yorkshire; and in the fishes and ichthyosaurs of Charmouth. Perhaps the most interesting cases of fossil compressions are found in the shales and gritstone that overlie coal, where the large cylindrical stems of *Sigillaria* and *Lepidodendron* are found as flat as paper, when buried between the laminæ of shale, depressed elliptically when lying across the grits, and retaining their original cylindrical figure when standing erect in the rocks.

Chemistry of Fossil Plants.—The chemical phenomena exhibited by fossils, are of the greatest importance. We may illustrate these by a brief review of the chief stages of alteration that plants are found to exhibit in passing from their original and living, to a fossil state.

1. They are found but little altered, as in the brown coal formations of the Rhine; and in a particular case at Gristhorpe, near Scarborough, among the oolites, where a plant, called by Lindley the *Solenites Murrayana* is found flexible, elastic, and with its tissues quite distinct.

2. The plants have become carbonized or bituminized, a very common conversion in the clays of every geological era, and plentifully in what are called the coal formations.

3. The substance of the original plants passes entirely away, by the combination of its elements with the surrounding parts, so that a mere blank remains; but an eloquent blank, for its shape reveals the sort of being that had once occupied the now desolate space. The coarse gritstone near Leeds affords examples of this state.

4. Lastly, the cells of the vegetable structure become filled with extraneous matter, as carbonate of lime—hence the pyrites of *Lepidodendron Harecourtii*, in the fruits of Sheppey; or with silica, and hence, the flinty or silicified wood of Woburn.

Chemistry of Fossil Animals.—These exhibit analogous changes. Thus we have—

1. Such relics as the scales of fishes, coverings of shell-fish, and bones of vertebrated animals, and which are often found but slightly changed, in some cases even retaining their gelatinous portions.

2. The next step shows to us entire shells, corals, and echinodermata, composed of carbonate of lime, and gelatine; the latter substance, in some cases, still partly preserved. From this state we pass, by almost insensible gradations, to that where the organized substances are entirely lost, as in the oolites especially; and there is either left a vacancy, on the sides of which the lost shell has sculptured itself, as it were, for a future memorial before its disappearance; or,—

3. There is a mass of mere stony matter, which also tells the story of what has taken place, by exhibiting on its surface the exact representation of the animal, whose being it has absorbed into its own. It is curious to note, that while it was by the absorption of carbonate of lime the vacancies above referred to were formed, it is by carbonate of lime, in many cases, entering in a state of solution, that we find, in other instances, what would have been vacancies are filled up. Silica or flint, and sometimes (but unfrequently) iron pyrites fill those vacancies.

Relations of particular Rocks and Fossils.—The relations between rocks and the particular fossils they respectively contain, may be illustrated by a few examples. In the green sand formations, most of the shells and spongiadæ are silicious. In the oolites, the fossils are chiefly calcareous, lime being one of the commonest of these transforming agencies. In the coal formations, the fossils are more or less bituminous. Certain tribes—as the belemnites and ostracea retain their fibrous or lamellar structure, in all sorts of rocks.

Local Distribution of Fossils.—Fossils are found on the tops of the loftiest mountains of the Alps and Pyrenees, (showing that what was the original surface of the crust at the time the mountains had been upheaved, was carried upwards with them); fossil plants are found at the bottom of our deepest mines. Of course, fossils, generally, are most plentiful on or near the earth's surface, because the formations there are chiefly of a later origin than the stratified rocks which were uplifted in mountain chains. At the depth of a few thousand yards, they cease altogether to appear, with the cessation of the appearance of the stratified rocks, in which, alone, they are found. There are many interesting peculiarities connected with the local distribution of fossils. Some of the ancient limestones, about Torquay, in Devon, are composed almost entirely of the remains of animals, chiefly Polyparia, and Echinodermata, whose hard parts have been thus, in a sense, preserved. Another fossil species—the *Ostrea Deltoidea*, forms immense continuous beds in what is called the Kimmeridge clays of England and France. They extend for many miles about Weymouth; also, in North Wiltshire, and in Yorkshire, in our own country, and about Havre, in France.

Comparison of the Living with the Fossil Creation.—Professor Phillips, some years ago, estimated the numbers of existing (or recent) animals and plants, and of the same in a fossil state, in order to show the proportions of the two. In that estimate, the living creation was made to contain about 59,000 plants, and 115,500 animals. The progress of discovery shows that we may with safety nearly double the numbers. But the proportions between living and fossil plants and animals are not materially affected, and we therefore append them in the following table:—

Proportion of the Living to the Fossil Creation.

Terrestrial Strata	.	.	.	118 to 1.
“ Animals	.	.	.	150 to 1.
Freshwater Plants	.	.	.	2 to 1.
“ Animals	.	.	.	14 to 1.
Marine Plants	.	.	.	25 to 1.
“ Animals	.	.	.	2 to 1.

But this table requires to be read with caution. As all these fossils are preserved in beds that once formed the bottoms of lakes or oceans, we cannot expect to find terrestrial plants and animals in them, in such numbers as we find the shell-fish and zoophytes. The one class must have been carried thither by accident, such as inundations, &c.: the other naturally belong to it. While, therefore, we have of the first but a very imperfect representation, of the second we possess almost as great an abundance as we could desire. We may conclude this part of our subject, by stating that organic fossils bear so general an affinity to existing life, that they may be *all* ranged in the same great classes, *most* of them in the same great orders and families, *some* in the same genera, and but *very few*—and these only in the latest strata, in the same species.

Division of Fossils.—By the various opportunities thus indicated, we are enabled to divide all fossil relics into—

1. Petrifications.
2. Bituminizations.
3. Metallizations.
4. Marks of vital action.

Petrification is the process by which stony matter, in a state of solution, interpenetrates the pores of mineral and vegetable remains. If we bury bones in clay, mud, or lime, we shall find them in a year or two harder and heavier, and, in a word, rapidly assuming the appearance of true fossils. The process, indeed, is one that is constantly going on, under certain circumstances, even on the surface of the earth. The woodwork of a Roman aqueduct, near Lippe, in Westphalia, is partly petrified. The wood and nuts of the hazel are found in a state of petrification at Ferrybridge, in Yorkshire, and on the shores of Lough Neagh, in Ireland. Springs containing lime, chemically dissolved, are familiar instances of petrifying power. Organic structures are not necessarily destroyed by petrification. Thin slices of fossil trees, when made highly transparent, will often show traces of vegetable fibre. Fossil zoophytes, of a calcareous origin, when steeped for some time in acids, will yield up the lime in a state of solution, and exhibit the original animal distinct in form, and sometimes in possession of its natural colour.

Bituminization.—When vegetables are left on the surface of the soil, they rapidly decompose, and what remains to the eye is merely so much mould. But if subjected to moisture, and partly excluded from the sun and air, a semi-bituminous substance is formed, analogous to peat. And if they are completely buried, so that the volatile principles cannot escape, nor the air act upon them, and they are subjected to pressure, then bituminous matter will be formed in various states of purity, according as more or less earthly matter is mixed with it. What takes place in the earth during this conversion of vegetables, may be judged by watching the effects produced on half dried hay, which, when it is thrown into a heap, ferments, becomes black, and not unfrequently takes fire, and is consumed. Coal may be taken as one of the most common of these bituminous products.

Metallization.—Strata which contain fossils, generally contain also metallic substances, such as iron. All metals can be dissolved as well as fused, and it is not difficult, therefore, to understand how they may be brought naturally into such a state, as that they may enter the pores of vegetable and animal substances, in a manner corresponding to that already described in connexion with petrifications. All organic structures, after death, while in a state of decay, give off gases: water, of course, is present, entering, as it does, so largely into their substance; and thus the metals, the gases, and the water, acting chemically upon each other, produce compounds which are slowly infiltrated into the pores, and thus metallic fossils are produced. Sometimes these fossils are so entirely metallized, that only the form and aspect of the plant or animal remains; sometimes the plant or animal is found essentially complete, but entirely penetrated throughout with the subtle metal; sometimes the fossil is merely covered with an incrustation of metallic salts; and sometimes, while the exterior alone is thus metallized, the interior remains stony or bituminous.

Marks of vital action, which refer obviously to animals alone, may be thus classed:—

Foot prints of quadrupeds, of which the sandstones of Cheshire and Dumfriesshire afford good examples;

Holes made by certain animals in certain rocks—as, for instance, by the lithophagus conchifers in the Mendip limestone; and

Perforations made by one animal in the shells of another—as by the zoophagous mollusk in the valves of conchifers.

Results.—By all the various means thus indicated, the geologist pursues his inquiries into the past history of the globe. Stratification shows him the various surfaces of that globe at different periods; and the very irregularities of the strata only

increase our knowledge, by informing us of the strangely perplexed and troubled character of the events accompanying the gradual development of the material and half chaotic crust into its present state of beauty and peace. Fossilization completes, as it were, the requisite information, by explaining how the world was peopled during the same periods, which are so widely divided in time, that no geologist, who cares for his reputation, will venture to assign to them any definite term.

We shall now present—in an arrangement chiefly founded upon, though somewhat modified, typographically speaking, from Professor Phillips' table—a complete view of the series of the strata as they are traceable in this country, and of their fossil contents, grouped into systems, and the systems again grouped into the chief leading divisions or formations known among geologists.

Superficial Accumulations.

Soils of various kinds, arising from the decomposition of vegetable and animal matter, and of the surfaces of rocks.

Alluvium, or deposits of clay, sand, and gravel, through the ordinary action of water.

Diluvium, or deposits of clay and gravel, formed by unusual operations of water, and accompanied with boulders, or great erratic masses of rock.

Tertiary Strata.

Clay, estimated at sixteen yards in thickness, consisting of a water-drifted mass of marine shells, pebbles, &c., resting on more regular shells, beds of sand, or sandy limestone. About forty per cent. of the shells are supposed to be identical with existing species.

Freshwater Marl, about thirty-three yards thick, occurring only in the Isle of Wight, and including a bed of estuary shells.

London Clay, 100 to 200 yards thick, forming a mass rich in marine shells, of which three-and-a-half per cent. are identical with recent kinds.

Plastic Clay, 100 to 400 yards thick, containing variously coloured sand and clays; the latter containing organic remains identical with or allied to those of the London clay.

It will be seen, therefore, that in this formation there is a small number of fossils identical with existing species.

Secondary Strata : Cretaceous or Chalk System.

Chalk, 200 yards thick, of unequal hardness, soft above, marly below, with interstratified flints; extinct zoophytes, *ananchytes*,* and other echinodermata.

Green Sand, about 160 yards thick, consisting of—

Upper Green Sand, very fossiliferous, in general chalky;

Galt, a blue marl or clay, often very fossiliferous, and distinguished by the presence of the *Belemnites minimus*; and of the

Lower Green Sand, or iron sand, which is very fossiliferous in places.

Secondary Strata : Oolitic System.

Wealden, about 300 yards thick, and divisible into—

Weald Clay, with freshwater shells, and containing *Cyprides*;

Hastings Sand, with land plants, and bones of *Iguanodon*; and the

Purbeck beds of clay and limestone, with fresh water shells.

Portland Oolite, about 130 yards thick, formed of an Oolite limestone, locally variable, containing some beds full of fossils; and the Kimmeridge clay, with layers of *ostrea deltoidea*.

* Fossils thus printed in Italics, are especially characteristic of the strata.

Oxford Oolite, about 150 yards thick, consisting of—

Upper calcareous grit ;
 Coralline oolite, with beds and masses of coral, *Echinida*, and many shells ;
 Lower calcareous grit, with *Ammonites catena*, and *Pima lanceolata* ;
 Oxford Clay,
 Killarney Rock, } containing *Ammonites Calliovensis* and *Gryphæa dilatata*.

Bath Oolite, near Bath, about 130 yards thick, consisting of—

Cornbrash, a thin, impure, shelly limestone, with *Avicula echinata* ;
 Forest Marble, a shelly oolite, with concretionary sandy limestone ;
 Bath Oolite, in several divisions, in shelly, oolitic, compact, and sandy beds, containing *Megalosaurus* and *Apiocrinus* ;
 Fuller's Earth, a series of calcareous and argillaceous shelly beds ;
 Inferior Oolites, with *Pholadomya* and *Trigonia striata* ; and
 Sand, with concretionary masses holding shells.

Lias, about 350 yards thick, composed of—

Upper Lias Shale, full of characteristic Saurians, of *Ammonites*, *Belemnites*, and other shells ;

Marlstone, replete with *Terebratula*, *Pectinida*, *Avicula inæquivalvis* ;

Middle Lias Shale, containing *Gryphæa*, *Ammonites* ;

Lias Limestone, with *Gryphæa incurva*, and *Ammonites Conybeari* ; and the

Lower Lias Shale, and coloured marls.

Secondary Strata ; Saliferous or New Red Sandstone System.

New Red Sandstone, about 300 yards thick, comprising—

Coloured Marls, Gypsum, Rock Salt ;
 Red and White Sandstones, and Marls ;
 Conglomerate and Sandstone, } containing few or no organic remains.

Magnesian Limestone, about 100 yards thick, formed of the

Knottingley Limestone, with a few bivalves in the lower beds ;

Gypseous Red Marls, having no fossils ;

Magnesian Limestone, with shells and corals ;

Marl Slate, containing *fishes* of remarkable forms ; and the

Red Sandstone, in which plants of the subsequent coral series occur.

Secondary Strata : Carboniferous System.

Coal, about 1000 yards thick. The subdivisions of the coal series are only locally ascertained ; gritstone and shale constitute the principal mass. Flagstone and ironstone are among the most characteristic layers. Fresh water limestone and marine limestone are exceedingly rare and local. The shells are mostly of estuary origin. The plants are abundant, and mostly of terrestrial tribes and extinct genera.

Carboniferous, or Mountain Limestone, about 800 yards thick, comprising—

Millstone Grit, a series of sandstone, shales, coals, and thin limestones, forming a transition group between the coal and the carboniferous limestones.

Yoredale Rocks, consisting of five or more beds of limestone, with alternating flagstones, and other gritstones, shales, thin coal, and ironstone.

Lower or Sand Limestone, in the north of England and Scotland, subdivided by sandstones, shales, and coal seams. They yield characteristic *Crinoidea Productæ*, *Spiriferæ*, *Orthocera*, *Bellerophon*, *Goniatis*.

Alternating Limestones, and Red Sandstones, forming a transition group between the Carboniferous Limestone and Red Sandstone formations.

Conglomerates and Sandstones, in which no fossils have yet been noticed.

Coloured Marls and concretionary limestones, called corn stones, with a few fossils ; and lastly,

Tilestones, or Flagstone beds, with a few fishes.

All the fossils, through the whole of these Secondary Strata, belong to extinct species, and are different from those in the Tertiary Strata.

Primary Strata : Silurian, Upper Grauwacke, or Transition System.

Ludlow Rocks, about 660 yards thick, comprising—

Sandstones, with the fossil species of *Orbicula*, *Lingula*, *Terebratula*, *Spirifera*.

Limestone shale, with the Fossils *Pentamerus* and *Homonolutos*.

Wenlock Limestone, about 600 yards thick, formed of—

Limestone,	}	Both containing corals and fossil Crinoidea in vast abundance, with Euomphali, Producta depressa, Orthocerate, Calymene Blumen- bachii, and other Trilobites.
Shale,		

Caradoc Sandstone, about 830 yards thick, comprising—

Shelly Limestone, and various Sandstones, with *Pentamerus*, *Terebratula*, *Orthis*, and Trilobites.

Dandelo Rocks, about 400 yards thick, consisting of calcareous flaggy beds, including Asaphus Buchii and other Trilobites.

*Primary Strata : Cambrian System.**

Plynymmon Rocks, consisting of—

Argillaceous indurated slate, and sandy system slates, in which no fossils have yet been found; and—

Calcareous and argillaceous rocks, with *Orbicula*, Zoophytes, and other organic remains.

Bala Limestone, formed of calcareous and argillaceous rocks, with Orbicula, Zoophytes, and other organic remains.

Snowdon Rocks, comprising variously coloured and indurated argillaceous slate. Few fossils have been observed in these rocks in Wales.

Clay Slate, a soft, dark slate, with no known fossils.

Primary Strata : Skiddaw System.

Chiaistolite Slate	}	Soft dark slates, mixed with the minerals that give them respec- tively their names, and both apparently destitute of fossils.
Hornblende Slate		

Primary Strata : Mica Schist System.

Mica Schist beds, containing no organic remains, and composed of mica and quartz, alternate with gneiss, chlorite schist, talc schist, hornblende schist, clay slate, quartz rock, and primary limestone.

Primary Strata : Gneiss System.

Gneiss beds, composed of mica, quartz, and felspar, alternate locally with mica schist, quartz rock, and primary limestone.

In all the above primary strata, the fossils belong invariably to extinct species, and often to extinct genera and families. They are different from the secondary and tertiary strata. The stratified argillaceous rocks comprised in the Cambrian and Skiddaw systems, are not yet fully understood, on account of the rarity of fossils, and from other causes. The arrangements given, which are based on the labours of Sedgwick, are, however, correct with reference to the succession of deposits in the Welsh and Cambrian districts. The thicknesses are insufficiently known.

The unstratified rocks are now again reached, forming the general basement or floor of all stratified ones.

* This and the following (or Skiddaw) system, are sometimes collectively spoken of as the Clay Slate system.

Succession of Organic Life.—In reviewing the strata and their contents, certain salient facts and deductions of high interest are impressed upon the attention. We perceive that as each of these strata contains the fossil remains of plants and animals that once lived on the land, or in the rivers, seas, and oceans, at or before the time of the formation of the strata, we are enabled by combining together all the facts they collectively afford, to arrive at a tolerably accurate view of the succession of organic life on the globe: a most interesting theme, and which has tempted many scientific men into the construction of theories of greater or less ingenuity. The theory of progressive development, advocated in the well-known work on the *Vestiges of Creation*, is an instance in point. We shall not enter upon the consideration of such matters. We conclude our present chapter with a summary of the most striking facts that present themselves in connexion with the known successional order of organic life.

Fishes are the only class of vertebrated animals which are found in all the systems of strata: a fact having an obvious connexion with the aqueous origin of all the stratified rocks.

Reptiles begin to appear either in the carboniferous system or in the one above it, called the New Red Sandstone.

Birds and Mammalia appear but rarely in various localities in the oolite rocks; and it is believed that the amphibia, or fresh-water tribes of batrachida, are not discovered in either the primary or secondary strata. Lastly, as to

Man, the perfection, so far as we yet know, of all organized life—where does he first appear? The answer is, nowhere but in the loose surface soil, in mud, gravel, and caverns, and generally accompanied by pottery, bones, and other relics of the early industry of our kind. Can any more decisive evidence be afforded of the lateness of the period when man first trod the earth, of which he was to become supreme master, or of the incalculable ages—the unfathomable abysses of time, as we might rather call them—that must have elapsed before his home was deemed sufficiently prepared for him.

THE SEA SLUG.—Evil qualities are frequently assigned to animals unjustly. An example of this we find in the sea-hare, or *Aplysia*, which, from very ancient times, has been held in bad repute as a malignant. The ancient Romans regarded this sea-slug with exceeding horror, and believed that its aspect alone caused sickness—nay, death itself, sometimes, in its beholders. Pregnant women were brought to bed before their time, if, unluckily, they caught sight of this ill-omened creature. Its nest was said to infect the air. The fool-hardy meddler who handled it, swelled, and probably burst, in consequence: at any rate, his hair fell from his head and chin. Subtle poisons were concocted from its slimy corpse. With these, Lucretia drenched to death the enemies of Nero, and prepared a like beverage for the crazy tyrant himself; but his stomach could not muster resolution to receive the odious draught. An inquisitive virtuoso could not marry a rich widow in those days, without having the sea-hare summoned as a witness against him. Apuleius having done so, he was accused of magic, a very strong proof against him being his employment of fishermen to procure *Aplysia*, for the purpose of satisfying his curiosity by a careful examination of them. The poison was reputed subtle and peculiar in its action, killing very slowly and deliberately, not absolutely destroying life until after as many days as the sea-hare itself had lived after having been taken out of the sea. Its employment, however, was not safe to those who used it, for it betrayed its presence by too many peculiar symptoms in the human sufferer, who gave out an odour from his body, similar to that attributed to the mollusk. Even in these enlightened days, fishermen all over the world—Britons and Italians, Malay and Polynesian, devoutly believe in the evil qualities of this sea-slug. How strange that so prevalent, so far-extending a superstition, should be absolutely groundless. All modern naturalists of reputation who have examined the sea-horse about its poisonous qualities, have agreed to pronounce it guiltless of the crimes laid to its charge.

—From the New Number of the *Westminster Review*.

A FEW TURNS IN A PICTURE GALLERY.

VANDYCK HALL.

MY DEAR REGINALD,—When I came hither, a fortnight ago, it was under the promise that I would send you a description of all the lions to whom I should be introduced, the situation and appearance of this house, &c. &c.; in fact, little less than a faithful journal of my sayings and doings; which said journal doubtless would be as entertaining as *Punch*; and, indeed, vastly instructive for those favoured mortals to whom a sight of the precious document might have been vouchsafed; and such superior beings as yourself and Miss Annie Harrington (may I entreat you will present that damsel with a thousand roses of the tongue! to employ an oriental metaphor?) would, after its perusal, have justly exclaimed with Bouchardon, who, on reading the verses of Homer, declared that the universe was enlarged, and mankind three times as tall as they were previously. But the *Parcæ*—to oppose whom would be to drive back the sea-tide, and to bind the planet-stars—had otherwise determined; and this promised embryo diary, which might have quickened the pulses of the world, and, for elaborate record, have surpassed the renowned efforts of Boswell or Crafticanto, the elfin journalist, whom Keates has presented to us in his fantastic “Cap and Bells,” was forced to stand back, nay, to betake itself off altogether, to make way for rides, walks, shooting parties, balls, eating, drinking, sleeping—*que voulez-vous?* I am quite tired of enumerating. Believe me, this is the first morning since my arrival, during which I have been sufficiently sedate to collect my ideas for the inditement of an epistle; and now I am writing in a room full of company, the greater part of whom are chattering like tongue-slit magpies. I should justly die the death of Cæsar, were my pen audible, the crochet needle being substituted for the dagger! To give you some idea of the difficulties besetting this task—the icebergs, coral reefs, and beds of tangled weed, that must impede the course of a vessel—I should lay before you a specimen

or two of these human remoras, which, under ordinary circumstances, would render the navigation of a letter difficult and irksome in the extreme. At the same table with myself, three or four nice looking girls, and as many men, are attentively examining a volume of costume engravings, and deep in the mysterious composition of a charade.

“For the sake of literature, Mr. Rochester,” says one of them, who rejoices in raven hair, and eyes brilliant, changeable, and indescribable as the falls of Niagara, “for the sake of literature, do not scribble on so doggedly, but just give us your opinion on the propriety of Miss Belgrave’s appearance to-night in the character of Sappho.”

Myself. “Why, is she about to take the lover’s leap!”

“Oh, no! but she is obstinate in the conviction that her lyrics are, in style, a compound of Alaric Watts and the impassioned Lesbian, and therefore no one is so fitted to support the character as herself; and she is so—so stout—only fancy her in Grecian drapery!” Here I am interrupted by a servant bringing a message from the billiard room, requesting me to join in a game; and as I am scrawling a reply on the back of an envelope, a leash of obese old ladies demand my attention. These good creatures array themselves in crimson of an evening, as a spectacle for company; and were wont, in days of yore, to surmount a bay-colour frizzled peruke, with a silver lama turban; and, having heard of something in the scandal line, are on the *qui vive* for fresh intelligence, and would gladly sweep the carpets on their knees, if there were the least chance of succeeding in the discovery of a single particle.

You will ask, “How is it, then, that you are ‘sufficiently sedate’ to think of writing to me, whilst your thoughts, it would seem, are in requisition elsewhere?”

I will tell you. For the last three or four hours, I have been occupied in examining the collection of paintings, for which you know this place is rather famed; and nothing, with the exception of music, so composes my ideas, and at the same time makes me so desirous of committing my thoughts to paper, as the sight of a few good pictures. After the inspection of a masterpiece of art, it seems as if some-

thing, calm as Deity, were stirring within, quietly demanding to be heard; and my quill gallops on over the paper, careless as a prairie horse, and enjoys a freedom, a latitude of opinion, (not waiting, not caring often, to consider whether I am broaching sense or nonsense!) which makes it a luxury to perpetrate a gossiping epistle to a friend. I have heard others express the same feeling.

Perhaps this is a proud and selfish excuse for not writing before, and you may reproach me with exhibiting a tincture of the arrogance of Lucullus, who, as Plutarch tells us, on some Greek friends declining his dinner invitations, on the plea of the enormous expenses they led him into, remarked to them with a smile, "It is true, O Greeks, that this is partly done on your account, but mainly on account of Lucullus." Never mind, my dear Harrington, I know that you take my letters as folks do their spouses—for better, for worse; and after having, ere now, contentedly ridden in the baggage waggon when my wheels have been heavy, you will not object to this broomstick career, although I confess that you would not have heard from me now, despite my promise, had I not been in the humour for pen exercise—*cacoethes scribendi*. But a truce to this rhodomontade, for I intend you to take a few turns with me in the Picture Gallery of Vandyck Hall, which I know will please you, as you are a bit of an artist—not a Stanfield, nor a Landseer, we are well aware, but one riding his nag very prettily along the road, and, for a boy of sixteen, executing rather praiseworthy sketches, which sometimes makes me afraid lest you may presume that your natural talents will be able to complete what industry alone can compass. People often tell you, when you are showing them a drawing, that "it reflects the highest credit on you;" "it is prodigiously clever"—they "never saw anything of the kind half so elegantly done before," &c., to the end of the stock list of phrases poured forth by visitors in the hearing of those papas and mammas who are so unfortunate as to possess "prodigies" in their darling offspring. Remember that nineteen out of twenty attach no meaning whatever to these words; or, if they do, may be perfectly ignorant of the art they pretend to

judge; and if you were to inquire of them what part of the piece they admired most, would very probably fix on the vermilion-decorated old woman coming up the lane. "So precisely like old Betty Limp, is it not! the very shade of her gipsy cloak;" or acknowledge a penchant for that vile emerald green boat which disfigured your last picture. You know as well as I do that you hold the power of copying correctly most of the drawings that chance to fall in your way; but this is not all that is requisite, although the art is only an amusement to you. You should try to excel in your diversions, as much as in your studies. I am sometimes as glad to hear that you have won the game at cricket, or been victorious in the battle of chess, as when you inform me that you have mastered some complex mathematical theorem. Aim at perfection, my dear Harrington; try to do all things well. This is not to be accomplished without labour and perseverance—two of the most divine of human attributes! The maxim of Apelles, the great artist of antiquity, which he had written over the door of his *atelier*, or painting chamber, was, "*Nulla dies sine linea*"—no day without a line; and it is one that should be imprinted on the heart of all who desire success in any work. When you are setting about anything, devote your whole mind to it—clear the temple from the miscellaneous crowd that would interrupt the services, as the ancient priests were wont to do, crying aloud, "*Procul, O procul, este profani!*"—"Away, away, O ye profane!" and driving back the 'many' from the adytum.

But to proceed towards the "Gallery." Although you are a draughtsman, and tolerably enamoured of pictures, I cannot expect that you are as fond of them as I am myself. That is almost impossible. I am never better pleased than when in the company of a room full of *chefs-d'œuvre*, as I have been this morning. (I am not alluding to the present moment, though one or two of the wallflower tribe above-mentioned are indisputably first-rate works of art! Pardon me for infringing my own precept—"Procul, O procul.") Goldsmith, I think it is, who recommends people in a picture gallery to praise the works of Pietro Perugino, and to observe, if they wish to be thought connoisseurs, that "had

more care been taken in the execution, the picture would certainly have appeared more highly finished!" Undoubtedly a very safe mode of criticising; but I should hope you went a little farther than this, and regarded paintings not only as so many *Georgiones*, *Caravaggios*, *Ostades*, or *Claudes*, before which the world should bend in profound worship but for the sentiment conveyed to the soul by them, no matter by what master, by what hand. I sometimes consider a good gallery superior to a library—"the soul of a mansion," as I believe *Cicero* has called it; for you can there enjoy all kinds of histories, poems, and tales, without having the trouble of holding a volume in your hand, or the fatigue of reading. You see I do not at all agree with *Dr. Johnson*, who affirmed, "Painting, sir, can illustrate, but cannot inform;" on the contrary, I hold it to be in the highest degree instructive, truthful, oracular!

What descriptive suggestions does not one of *Titian's* superb productions raise, with its richly glowing tints—glowing, yet delicate exceedingly, as the pink lining of a shell, its air of freedom, its voluptuousness of form, breathing of the ripe sunny south!" I have often, when gazing on some magical conception of *Correggio's* brain, fancied I was listening to the marvellous recital of an ancient monk in the calm solitude of a dim abbey cloister, while far off the opaline sunrays streamed in through jewelled panes, far off as the faint radiance of other systems looming through space, and imagined I heard the soft chords of the distant organ pealing through shadowy aisles and vaulted corridors, sounding in my ears like the divine voice that spake to *Moses* in the wilderness of *Sinai*, commanding him to loose his shoes from off his feet, for the spot whereon he stood was holy ground.

Some cattle of *Cooper's* handling is the first piece that pleases one in this collection—that is, if we take the pictures in the same order as I did this morning, especially when the light serves for them, as it then did. The variation of light has a vast deal to do with the beauties of a picture. Some are altogether lost when it is subdued, while others suffer equally from glare. You know the *Salvator Rosa* in the *Belgrave's* dining-room (with the group of wild rob-

bers about that peculiar willow-like tree, that flourishes in almost every *Salvator Rosa*), in which the gleaming pool of metallic water, surrounded by savage crags, is never visible in the winter season, except from eleven to two o'clock. On this account I think one can seldom judge the merits of a picture at the first examination. A charming allegorical composition by *Eastlake* may next give us pleasure. It is admirably painted, but rather too waxy: perhaps this is not a fault in the symbolical, figurative line, which should be dreamy and indistinct in execution, to express even from afar the mysteriousness of the subject. In this picture, a lovely female figure, representing *Virtue*, is seated on an eminence, supported by an angel, and encompassed with a band of cherubims; while the serpent form of *Vice* is dimly visible, gliding away amongst the rocks in the foreground. *Virtue* is beautiful, captivating, triumphant! and the whole displays that rare arrangement recommended by *Titian*, the light falling on the figures as a sunbeam on a cluster of grapes. But the cherubs, although exquisite, too much resemble intellective but earth-born children; and the greatest wonder of all is, how the angel has managed to put on its tunic with those huge wings starting up from its shoulders. But I grant I am too severe; for the picture gave me at least one quarter of an hour's unalloyed enjoyment; and in less than half that time I found myself objecting to a "*Sir Joshua*," which was pronounced by everybody else to be immaculate.

An Italian scene, by *Turner*, extravagantly gorgeous, claims our notice; when at length we pass away from *Eastlake*. We may be enraptured here; but, to tell the truth, I find myself continually floundering out of my depth, when I strive to fathom the ocean, boundless and sublime, of this transcendent genius, called by some the forerunner of the pre-Raphaelite gens—a nation who it seems to me, with all their professions, (*vide Ruskin Defensor*,) are, to employ the terms of dear old *Sir Thomas Browne*, "oftimes faine to wander in the America and untravelled parts of Truth." You must remember "*The Return of the Dove to the Ark*," in last year's Academy Exhibition—the two Chinese-looking objects in magnificent drapery, that are stuck

in a sort of hayloft, where every straw is given with the fidelity of a Venetian mirror! Here is a Van Eyck equally accurate, equally startling. So far I partake of your enthusiasm for Millais, the Magnus Apollo of the young England school; his picture, referred to above, has the power of dragging the spectator towards it, and, despite a legion of faults, is boldly original and suggestive. We observe the same of Rubens, whose Flanders horses and Flemish belles disgust; and yet we are enticed, nay compelled, perforce, to look again and again on his production. It may seem extraordinary that, casting aside human beauty as an aid in producing effect, this peculiar sect should seize on masses of brilliant colour wherewith to work their purpose; in this also, peradventure, they may be said to resemble Rubens, who accomplished by lustrous, almost gaudy brightness and breadth, that which the supreme style of art sometimes fails in. It is not the crime of the young artist of old, who was rebuked for making Helen rich, as a substitute for her loveliness; simplicity, even to plainness, is their creed; and they prove the needlessness of perfect symmetry—of the patchwork of Lesbias' eyes and Aspasias' hair, in the grateful sense of unity which some of their works preserve, fascinating the spectator without his knowing why. But I am far from deeming that they have already struck the stars with their heads, as you would induce one to believe: you, who would give them an apotheosis before they were dead! No, even Raffaele, according to Mengs, only walked with propriety on the earth; and to the Greeks alone has it been permitted to sail majestically betwixt earth and heaven.

There was an artist staying here a few days since, (Neutraltent, the celebrated water-colour man,) with whom I had two or three conversations on this very thesis. He considers that these "new lights" will do greater injury to art than is generally supposed: though there is no danger of their setting the Thames on fire, they are drawing a third part of young England after them, and the multitude of their disciples have eyes only for the gaudy robes and stiffened joints which are the blemishes of their microcosm; and are charmed with the new mode as children with the daring

singularity and hair-breadth escapes of a rope-dancer.

By the bye, Neutraltent employs and strongly recommends hog-hair tools for sketching; and, having tried them, I am quite a convert, and intend making a hecatomb of my old sables and camel-hair brushes, and using nothing but pig-bristle, as it works most easily, and is more economical than the other. Of course, for minute and delicate objects—where the tenuity of stroke attributed to Protogenes, Pamphilus, and Euphranor, and that fineness of touch, the glory of Tibetan and Hindoo artists is required—we must still patronise our old retainers; but for outdoor sketching, none that had once tried the hog-hair brush would ever return to the sable pencil. Again, you always make an outline of your drawing in black-lead. Try for the future to do without this, and lay in your tints broadly at once: you will find this rather difficult at first; but the primal awkwardness overcome, you will feel yourself amply repaid by the facility which will be engendered by the constant care and boldness of handling here absolutely necessary.

Neutraltent also showed me what he calls his "bubble-book;" a little volume in which he inscribes any evanescent appearance in the face of Nature which he may not have time to copy in his sketch, but which he would like to introduce into the finished drawing. This is an excellent thing, and what I would recommend all young draughtsmen to have, as they frequently put by their sketches for awhile, and when they take them again in hand to work them up, they have entirely forgotten the minutiae of the landscape, which gave such an air of truth to those drawings completed on the spot, and which may be recalled to the mind's "inward eye" by a few simple, easily taken notes. I will give you an example:—

"*Bullerton Bay, August 1851.*—The sky of a clear, purplish blue, save over the distant main and along the pink cliffs of Scarley, where rests a stupendous mountain chain of grotesque and snow-white thunder-clouds. *Mem.* As little colour as possible to be used in shading these. N.B. As each wave rolls along the beach the sunlight strikes it, not in one long lance of light, as

I have sometimes noticed, but in a quick succession of bright round spots, that diminish in size and lustre from the point where the breaker curls over, bursting into foam, &c.,—*ad lib.*"

The accomplishment of sketching from nature is so delightful, it is a source of such unsullied enjoyment, that I would invite every person, gentle or simple, that had the slightest ability for it, to drink of the well from which I myself have derived the purest refreshment. Very grateful am I to the great Giver of Good for his bounty bestowed therein; but I can never be sufficiently so for his inestimable kindness in enduing me with that which has proved a restraint from evil, a solace in misfortune, a key wherewith to unlock the prison-doors of the beautiful and the divine.

The merest daub of our own is superior to a miracle of art, in bringing home to the memory the charms of a view. We can hear the birds singing amidst the trees, and feel the soft summer breeze fanning us as we look upon our own handiwork.

One great fault that a young artist should be warned against, is the descending into particulars in his first draught; *au contraire*, he ought to let this be as free and simple as possible—the mere trace of the mountains, the masses of wood and cloud, and the wide deep shades of water; nor attend to the delicate atmospheric hues, the spotty and various foliage-touches, the rotundity of the cloud, the lights and froth of the stream or lakelet, till he is preparing to "finish" his work.

Cleanliness should never be lost sight of by the artist, to whom a dirty palette, a stained folio, an unwashed, dirty rag for a rubber-out, or anything that is offensive and disorderly, is a disgrace. *The colour-box and brushes should always be ready for use.* Perhaps you may deem this below your notice, but I would have you remember how the ancient aspirant for the wreath at the Olympian games was obliged to be especially careful in his diet, his mode of life, and other matters, which at first sight seem to have no connexion with the efforts of the studium. Many people use unstretched paper, either because they grudge the expense of a block, or will not take the trouble to strain it on a proper board. This appears to me to be a very slovenly and

reprehensible practice: the paper becomes crumpled, the colours run into one another, and if worked up ever so much, the sketch is rarely worth anything. But, hold—you must be quite tired of this practical lecture, and ready to resume our stroll; I only hope that I have not been "casting pearls before swine," in thus emulating those first-rate artists who of late have condescended to employ their leisure in adorning tea-trays, *et cetera!*

To proceed. A garden scene by Watteau next calls our attention, with his usual festive, light-hearted figures, grouped in picturesque attitudes amongst urns, and stately evergreens, and statues.

Watteau was never a favourite of mine. He is graceful, but one trully may repeat of him what Carotte said of Fontenelle—" *La musette du berger est garnie de dentelles, et ses moutons ont des colliers faits de rubans de couleur de rose.*" (His shepherd's pipe is trimmed with lace, and his sheep wear collars of rose-colour ribbon.) And we may soon bid him adieu, and enter into the intricacies of a Dutch "study," which, as the lady remarked, "looks like a kitchen rather than a study!" and, leaving this to examine Danæ, after Guido—in which the golden shower has been basely transmuted into a tempest of tarnished halfpence—we may pass on from this piece to the next, admiring some, condemning others, as I did to-day, criticising freely whatever fell in my way, which is easy enough to those who are not deeply versed in a matter, as Aristotle hath written:—" *Qui respiciunt ad parva de facile pronuntiant.*" (They who consider over few things give sentence easily.)

It is not the exquisite workmanship of a painting that charms me, nor that exactitude of imitation in which some of the ancients must have surpassed, if we are to credit the anecdotes related by Pliny and others, of the imitated red-tile roof in the theatre of Claudius Pulcher, that deceived the most sagacious birds, and tempted rooks to try to alight on it; of the grapes of Zeuxis, Parhasius's curtain, Alexander's horse, and the staircase of Dantos, against which, it is said, a dog dashed out its brains in attempting to ascend. These may be merely tricks of art; and Coppel's likeness of an abbé, which was so illusive in its aspect, as to induce several persons to

salute it, may have been but an indifferent picture to me.

I want something more than this: even the blue, cloudless void of heaven sometimes wearies me. But,

"My heart leaps up when I behold

A rainbow in the sky:

So was it when my life began,

So is it now I am a man;

So let it be when I grow old,

Or let me die."

I believe I sat for half-an-hour without moving this morning, before a portrait of Hamlet by Velasquez: the dark, bespangled dress, the delicately formed hand resting on the skull of Yorick, the melancholy, appealing beauty of the soul-speaking countenance, brought to my memory a thousand of the gems of Shakspeare's treasure-casket; but, besides this, the picture told a private history of its own, like that which clings to the walls of a deserted house—only this was calm, sunny, noble! Here was no wail of loneliness, no blast of regret.

Believe me, my dear Harrington, everything of worth possesses this apocalyptic echo—this secret history of a second being; but, like ghosts, they must be spoken to first ere they can reveal these grand acataleptic secrets.

The old Egyptians used only four raw colours, and were entirely guiltless of employing the rules of perspective, yet their artists managed to obtain this glorious effect; they somehow cast their souls into their work, and the gaudy and distorted delineations which cover their tombs, have a vague mysticism about them, reminding one of the legendary aureole surrounding a saint or expiring martyr; and through these simple angular figures and childish outlines, often looms the same eternal spirit that rests in grandeur on the broad, motionless pyramids, and the fascinating majestic front of the Sphinx. This peculiarity—which I believe you can comprehend, for I recollect when we were once together examining the Saint Catherine of Raffaele, in the National Gallery, you remarked to yourself, "It is a vision, not a picture!"—is not, then, confined to perfect admixture of hues and symmetry of design, which we should at first suppose could alone ensure it; nor is it chained down to any one style of art,

ancient and modern, epic and homely; all may entertain the seraph, though to the gaping world the ethereal one may wear the toil-stained garb of a wayfaring stranger. In the sublime imagery, the master pieces of Michael Angelo adorning the Sistine chapel in Rome, and in the dew-drop sparkling on a leaf in one of Lance's fruit pieces, this singular property is discernible.* Shall I say what it is? Perhaps my opinion may be presumptuous, but I believe that it is poetry, which runs through all the realms of thought, like Virgil's oak in the second Georgic, the tree sacred to Jupiter, whose spreading branches drank in the atmosphere of heaven, and whose firm roots extended towards hell—

"Quantum virtute ad auras,

Ætherias tantum radii in Tartare tendet."

Ancient writers of the science of music, affirm that it creates an admiration for order, and thus produces a love of virtue, (*i. e.* moral order). I can easily credit the same of painting. That both arts, noble as they are, may be perverted and degraded, is of frequent and unavoidable occurrence; but to those who regard them from the right point of view, the unutterable majesty of Michael Angelo, the wonderful chiaro-oscuro of Rembrandt, the sparkling truth (query, deception!) of Poussin—I have watched one of his cascades till it has appeared in motion—the sun and moonlight of Cuyp, like ravishing strains of melody, elevate the heart and fill the soul with gratitude, to know that in our fallen state there yet thus remains a portion of the divine and pure. Indeed, the artist may well be glad and thankful, since to him is vouchsafed a new sense, which to the world is wanting—the taste, if I may so speak, the taste of form and colour. To him it is a delicious treat to view the rich glow on a bank of wild poppies waving in the sunlight; to revel in the oriental eccentricities of an arabesque; to catch the freshest hues of mountain scenery beneath the cloud-robcs of the spring-tide; to watch the curve in the neck of the swan, or the rounded contour of the arm of a

* This is what Correggio experienced when at Bologna he saw the Saint Cecilia of Raffael, and, after contemplating this divine triumph of art for awhile, he murmured in ineffable bliss—"Anch io sono pittori!" (And I also am a painter.)

beautiful woman; to drink in the translucent sapphire, the liquid beryl of the ocean, and to penetrate the solid azure of an Italian sky. Others see these things, but I believe it is the artist alone who in his spirit appreciates them.

A celebrated master, in depicting the universal deluge, the better to express the immensity of desolation, left a corner of the canvas quite blank, considering that this vacuity itself conveyed the idea better than aught else could do. Were I to follow his example, the way in which I should conclude this long letter would be by a portraiture of the apartment in which I am sitting, which I think would plead for its faults and discrepancies more effectually than the most earnest apologies and excuses; but the dinner-bell—whose welcome note has set us all alive, like the advent of the young prince to the enchanted tower, in the pretty little French fairy tale, *La Belle Dormant au Bois*, (The Sleeping Beauty of the Wood),—warns me that I have no time for caricature, but must rather follow the rest of the world, who are gradually dispersing to their dressing-rooms; and so were I to persist in making the drawing, it would only be the likeness of a dreary, gloomy chamber, full of sofas, candelabra, tables, chairs, and vases of Majolica ware, without three human beings to enliven it. But my epistle is already as long as a fox's tail—longer than I intended it to be. In letter-writing, a good subject acts as a boom running out into the river to collect the driftwood, and in a short time you find quite a raft of timber floated down; and pictures are such delightful themes to me, that I never tire of either writing or talking about them, and could scrawl on now for the next—hours about the specimens of art dug out from the sepulchre of Herculaneum, Landseer's superb rabbits, Mexican hieroglyphics, Hogarth's perspective, Manes, the Persian, who was admired throughout Asia for his skill in drawing straight lines without the aid of a ruler—and the other "thousand and one" objects that would pass over the mirror of my mind. But all these, and more than these, must "bide their time." For the present, *vale*—farewell.

From your most sincere friend,

ROCHESTER.

EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE FOURTEENTH.

JAFFA, AND ITS HISTORY—DEPARTURE FOR JERUSALEM—PLAIN OF SHARON—ER-RAM-LEH, NOT THE RAMA OF EPHRAIM; ITS HISTORY AND TOPOGRAPHY—HILL COUNTRY OF JUDÆA—KARIET-EL-AANEB—MODIN—VALLEY OF ELAH—APPROACH TO, AND ARRIVAL AT JERUSALEM.

"THERE is not a bright stream, vale, moorland,
or mountain,

Nor a tree, nor a dingle, in deep forest dell,
From bleakest and barest rock, down to the foun-
tain [spell.]

That acts not on mem'ry as though 'twere a
HON. GRANTLEY F. BERKELEY.

"And now I view thee, 'tis, alas, with shame
That I in feeblest accents must adore!
When I recount thy worshippers of yore,
I tremble, and can only bend the knee;
Nor raise my voice, nor vainly dare to soar,
But gaze beneath thy cloudy canopy,
In silent joy, to think at last I look on thee!"
BYRON.

"Fallen is thy throne, oh Israel!
Silence is o'er thy plains:
Thy dwellings all lie desolate,
Thy children weep in chains."—MOORE.

WE are now in Palestine! We have entered that land which has been called the most favoured and the most guilty country under heaven—the land of Israel—

"Over whose ac'r's walked those blessed feet
Which eighteen hundred years ago were nail'd,
For our advantage, to the bitter cross;"

where the Christian and Pagan bled—where many a battle has been fought in the cause of the Cross; that land which is accursed of the Highest, "whose sky is as brass, and its earth as iron;" where pilgrims now flock from all parts of the world to worship at the Holy Shrine with the same fervour that distinguished the devotees of the first crusade. It is a land that every Christian must be interested in; one that those who have visited must remember in after years with pleasure mingled with reverence.

Jaffa, Jaffon, Joppe, Zaffo, or Artuso, as others call it, is thought to have been built by Japhet (Noah's son) before the flood. It is now called Yaffa, and is generally believed to be the representative of the ancient Joppa, so often mentioned in Holy Writ.

The tradition is, that Noah lived and built the ark here. Jonah embarked for Tarshish, 862 years before the Christian era, from this place: here the wood used for building King Solomon's temple was landed, after being floated from Berytus; here St. Peter raised Tabitha from the dead, and Simon the tanner dwelt.

Judas Maccabæus destroyed the Syrian fleet and the town by fire. Antiochus took it from the Jews, but restored it by order of the Roman Senate, and it was afterwards exempted from tribute by a decree of Caius Julius Cæsar. The pirates gained possession, but Vespasian wrested it from them, and subsequently the Saracens and Mamelukes became its governors. In 1776, Djeddar Pasha massacred the inhabitants; in 1799, Bonaparte took possession of the town, and massacred the Turkish prisoners on the beach, about a mile to the south of the town, and poisoned his sick soldiers in the hospital, to prevent their falling into the hands of the Turks; and in 1840, it fell into the hands of the besieging fleets of England, Austria, and Turkey.

There is a story attached to the place, about a certain Andromeda being chained to a rock, and a valiant Perseus rescuing the aforesaid from a most horrible sea-monster; all of which is very affecting, no doubt, in its proper place and time, especially when the people show the links that bound the poor unfortunate Andromeda, and endeavour to make you believe that Perseus comes there on stormy nights, and makes them all very uncomfortable for the trouble he had a long time ago—but it does not answer with everybody.

Certainly, there are worse places to be met with than Jaffa; but, then, there are better; not that I mean to say that Jaffa is a bad place; oh, no! let it speak for itself. First, there is not a decent horse to be got in it; the animal is sure to have broken knees, sore back, broken wind, kicking propensities, only one eye, string-halt, or some other infirmity, that makes you remember the place for ever after with bitterness and pain. Secondly, the town looks like one resuscitated after an earthquake; the streets are contracted, uneven, dirty, and suffocating; the houses appear heaped together in some parts, as if standing one upon another; while in others, there is

ample space for a fine square. In fact, I believe that there is not a second Jaffa in the world; and if there is, I can only say that it is a great pity. Thirdly, the people are anything but civil, particularly exorbitant in their charges, and extremely stupid, talkative, and ready to settle all disputes by the knife; so that one does not leave this very antique, though not agreeable spot with the best impressions, but with the most grateful feelings that it is far behind.

There is a tolerable Latin convent here, which the dear monks declare, with most intense earnestness, occupies the exact site that the house of Simon the tanner stood upon, where Peter resided many days. It is a shame that such people should be doubted; but which is the true spot?—the one they show, or the dwelling near the sea-shore which claims the like honour? Who is to decide?

The harbour of Jaffa is one of the worst on the coast, being perfectly open, except close to the shore, where there is scarcely sufficient water for large boats, although it is protected by a natural breakwater of rocks, which rise to the height of from four to ten feet above the level of the sea.

Jaffa was once strongly fortified, for on the south side there is a strong double wall, and a ditch thirty paces wide, which extends beneath the bridge on the N.E., the only entrance to the city from the landward.

Jaffa is about a mile and a half in circumference, with a miserable citadel, and a thick stone wall, which is very strong near the sea. The town is built in the form of a crescent, and contains 1,667 families, and of these about 1,500 are Mohammedans, 100 Greek Catholics, 60 of the Greek Church, and 7 Armenians.

The commerce of Jaffa is chiefly sustained by the cotton collected from the plains of Sharon and surrounding country, which is exported to Europe, with soap made from olive oil and ashes. The imports consist chiefly of rice from Egypt, and striped silks from Syria.

The gardens around Jaffa are so beautiful and luxuriant, that the place has frequently been called the garden of Syria. The light sandy soil is peculiarly favourable for the production of various kinds of fruit, such as pomegranates, citrons, oranges, lemons, figs, and prickly pears; but Jaffa is cele-



brated for the excellence of its water-melons, which possess a most delicious flavour not to be met with anywhere else, except at Damietta, in Egypt. These melons are sent as presents to all parts of Syria and Palestine, and, to prevent mistakes, the name of the person to whom they are addressed is cut in the rind.

We had seen quite enough of Jaffa; and as the consular agent did not appear to possess any influence in procuring animals to take us on to Jerusalem, I thought that it would be much better to go and look out for myself. When our party arrived at the starting place, we were informed that there were only four horses for hire in Jaffa, and that they were all engaged. It so chanced

that three of them belonged to our party, and the fourth to a party who were to start that night. Our prospect seemed to be a thorough pilgrimage to the Holy Shrine on foot, and it was only by promising some reward to a few lazy porters about the place, that we got about a dozen baggage mules to select from.

I cannot describe how much I was alarmed on seeing that the mule on which my journey was to be performed, had, instead of a saddle, a prodigious bag full of chaff; spliced cords for stirrups; and a chain fastened round his neck for a bridle. I entreated, promised *baksheesh* (a present)—generally a most magical word in the East—scolded, nay even went so far as to use my *courbash*, or cow-cane, but to no purpose. The people seemed to say, “Up you go, or you don’t go at all;” therefore I clambered up to my wretchedly hard seat, and had to keep my legs—fortunately long ones—so wide apart, that I arrived at Ramleh with my back almost broken, and heartily glad to avail myself of a few minutes’ rest, in order to stretch my half dislocated limbs.

The first part of our road* lay through gardens fenced with hedges of the prickly pear, which makes a most formidable defence against pigs, and other animals. Within the gardens were fig, orange, olive, and pomegranate-trees; and sometimes we saw a tower, where the owner of the orchard retreated during the heat of the day. The gardens open out into the plain of Sharon, so celebrated for its fertility and beauty.

The plain stretches along the coast from Gaza in the south to Mount Carmel on the north, while the hills of Judæa and Samaria form the eastern boundary. The soil is most fertile, but little cultivated or inhabited; and from some parts spring beautiful tulips, which "toil not, neither do they spin; and yet I say unto you, That even Solomon in all his glory was not arrayed like one of these." Around us lay several ruined villages, where jackals howled and dogs prowled, and nowhere could we see the form of man; so that the prophecy of Isaiah against the land appeared in full force—"Your land, strangers devour it in your presence, and it is desolate as overthrown by strangers."—(*Isaiah* i. 7.)

A bare uneven road, with an uncomfortable seat for three hours, brought us to the environs of Er-Ramleh, where the palm waved its long feathery branches, and the glow-worms revelled on the banks of the lanes.

Er-Ramleh signifies "the sand;" which name was no doubt given to it on account of being situated on a sandy plain. It has been called Ramlah, Ramle, Ramma, or Ramola, and was supposed to be the ancient Rama of Ephraim; but Dr. Robinson has argued the matter so well, in his *Biblical Researches*, that we cannot now entertain that idea. It was founded by Suleimân, son of khalif Abd-el-Melek, in the early part of the eighth century, after he had destroyed Ludd. It soon became a flourishing place, and before the time of the crusades was surrounded by a wall with twelve gates, had a fine castle, a mosque, and markets. In A.D. 1099, when the crusaders were marching from Antioch to Jerusalem, Count Robert of Flanders, with five hundred knights, set out to reconnoitre Ramleh, and finding the gates open and

the inhabitants fled, they took possession, and were soon followed by the remainder of the party. Here they remained three days, and feasted right well, holding a festival in honour of St. George, who was forthwith installed as their patron saint, and his tomb at Lydda, from whence they had lately come, was made the seat of the first Latin bishopric in Palestine; and the see endowed with the cities of Ramleh and Lydda, and their lands. The crusaders departed on the fourth day, but the city remained in their hands during the time they held possession of Jerusalem, as it was an important post for them. Ivelin burned it in 1177; Baldwin IV. at the head of the Christian army defeated Saladin the following year; but in 1187, the Saracen was victorious, and gained possession of Jaffa, Askelon, and Jerusalem. When the lion-hearted Richard advanced in 1191, Saladin caused the fortifications of Askelon, and Ramleh, the church of Lydda, and various strongholds, to be razed. In 1204 Ramleh was given up to the Christians, who retained possession of it until 1266, when it was wrested from them by the Sultan Bibars. Afterwards it became known chiefly as the halting-place for pilgrims on their journey to the Holy Sepulchre, and gradually became almost deserted, and fell into decay.

As soon as we had arrived at Ramleh, we proceeded direct to the Hospitium belonging to the Franciscan convent at Jerusalem, founded by Philip the Good, Duke of Burgundy, in 1420, for the reception of pilgrims on their way to and from the Holy City. This is built on the skirts of the town, and has a high wall around it. The old superior made his appearance after repeated thumps bestowed upon the door, and ordered us off, pretending that he thought we were robbers. It is more than probable that the inmates did not feel inclined to turn out of their beds to provide supper for us, as it was half-past eleven o'clock, and therefore adopted this method of getting rid of us. As there was not any chance of obtaining admission, we repaired to one of the khans and made a hasty meal, while our horses and mules followed so laudable an example.

The town is surrounded by olive groves and gardens, and has a slight declivity towards the east. The streets are narrow

* We started at sunset, intending to travel all night, and thus avoid the heat of the day.

and few; the houses large, and strongly built of stone in the usual style. It is said to contain about 3000 persons; of whom nearly 1000 are Christians of the Greek Church, and a few Armenians.

On the west of the town there is a lofty tower, called the Tower of the Forty Martyrs, standing amid the ruins of what appears to have been once a beautiful mosque. On the southern and eastern sides of the large quadrangle in which it stands, are the remains of arches; and we noticed, while resting here on our return from Jerusalem, extensive subterranean vaults, lighted from above. The tower, which is square, is built of stone, with windows of various forms, but all with pointed arches, and is about 120 feet high. It is said to derive its name from the bodies of the martyrs of Sebaste, in Armenia, having been deposited here; but this requires confirmation. We were unable to ascend the flight of stone steps that leads to the top, from which there is said to be a magnificent view extending over the valley of Sharon, and embracing the cities of Ramleh and Lydda, the Mediterranean, and the mountains "which stand round about Jerusalem."

Once more we took to the road, and a ride of two hours and a half over the plain introduced us to a new kind of scenery. Before us rose the dusky sides of a chain of mountains, towering with solemn grandeur to the height of nearly fifteen hundred feet above our heads. This was the border of the "hill country of Judæa." No verdant sward is seen, nor fields of golden corn; the mountain's side is scorched with the sun's fierce rays, the land is barren and bleak; a curse seems to hover over the spot, for the tinkling bell and bleat of the goats are unheard, the very birds do not seem to sing, and man's voice is seldom heard, or his form seen. All around was silent and sombre—perhaps still more so because wrapt in night's dark mantle. Night is the time for thoughts that crowd upon us as we enter realms like these; it is the time to dream, when waking, of romance and chivalry; for—

"Night is the time to muse;

Then from the eye the soul
Takes flight, and, with extending views,
Beyond the starry pole,
Descries, athwart the abyss of night,
The dawn of uncreated light."

As we rode onward along the mountain

defiles, over beaten, though deep and uneven tracks, we saw large coveys of the fine, fat, red-legged partridges that abound in Syria, and as we had not any fowling-piece with us, we were compelled to be content with the sight alone. Sometimes we rode along the dry bed of a winter torrent, full of large loose stones; then, we clambered up the side of a rugged and barren hill, that appeared to be half baked. Thus we continued, without any agreeable change of scenery, until we halted at a ruined khan, near which there was a good well of water. Here we refreshed the horses, and did not forget ourselves. Again we turned to the road, and did not draw rein until in sight of a small village, called by the natives Kariet-el-Aaneb (village of grapes), and Jeremiah by the Christians, from its occupying the supposed site of the ancient Anathoth, where the prophet was born.

The village is poor, and situated at the head of the valley of Jeremiah, occupying a commanding position. Above it, on the crest of a hill on the east side of the valley, is the dwelling of the celebrated robber chieftain, Ibrahim Abougôsh, whose name is the terror of pilgrims, and who long bid defiance to the Turkish troops. Near to the village are the ruins of a Christian church, apparently of the time of the Crusades, and a monastery attached to it, which was formerly occupied by the monks of the Terra Santa; but has not been inhabited for more than a century, in consequence of the Arabs having massacred the last inmates. To the south of the village, on the top of a high rock, stands Modin, still a place of great strength. It is in the territory of Abougôsh, and is remarkable for being the site where the city and tombs of the Maccabees stood; where Simon set up seven pyramids, one against another, for his father, mother, four brethren, and himself.

Having refreshed ourselves and beasts, we left the sterile neighbourhood of Jeremiah, and soon entered a valley the sides of which were planted with the vine and olive-trees, and patches of corn in terraces. At the end of the valley was a brook, crossed by a stone bridge, where, it is said, David picked up the pebble with which he slew Goliath; for this was the valley of Elah, or Vale of Turpentine, the scene of the combat,

Just as we turned the corner of the road

that leads from the valley, we saw the carcass of a mule, covered with eagles and carrion-crows, tearing away the flesh, while the jackals tried to drive them off. At this time in the morning, when it was scarcely light, the scene was novel, but not pleasant; yet, as it fully bore out the Scriptural assertion, that "Whosoever the carcass is, there will the eagles be gathered together," the incident was not altogether devoid of interest.

The morning came; the vapours round the mountains melted and were seen no more; the distant landscape was an indistinct mass of waving cypresses, and rocks riven by nature's dread convulsions. The sun rising diffused gladness to all; the heaven's wide arch was steeped in glorious hues, and each cloud was edged with crimson; then succeeded the soft golden tinge, as upward mounted the glorious orb, and anon the clouds seemed one mass of ethereal gold. Now, the valleys, the rocks, the waving trees, each stunted shrub and humble flower, smile through their dewy tears, and welcome creation's mightiest work. Even in this desolated land, we could not help feeling—

"How beautiful is morning, though it rise
Upon a desert!"

* * * * *

Oh! who can look
Upon the sun, whose beam indulgent shines
Impartial, or on moor, or cultivated mead,
And not feel gladness?"

Desolate, indeed, is the approach to the city where the Saviour of the world lived, taught, and died. We passed on by hut, rock, brook, and gardens, without seeing either man or beast; no chirping of glad-some birds, or bleating of flocks saluted us. The words of Moses are fulfilled, for the traveller almost involuntarily exclaims, "Wherefore hath the Lord done this unto this land? What *meaneth* the heat of this great anger?"* and the answer is as readily furnished, "Because they have cast away the law of the Lord of Hosts, and despised the word of the Holy One of Israel."†

In a short time we issued from a defile, and beheld the embattled walls of Jerusalem, above which some cupolas, minarets, churches, mosques, and domes of houses, raised their heads. Then, proceeding down

a gentle declivity, we beheld the Mount of Olives, crowned with the Church of the Ascension, before us; while, on the right, was the valley of the Son of Hinnom. Then, entering by the gate of Jaffa, or Bethlehem as it is sometimes called, we turned suddenly to the left, and, preceded by an old Maltese we met at the gate, threaded a number of narrow streets, until we arrived at the hotel kept by Antonio Zammulla, which is situated almost in the centre of the city, and commands an excellent view of the Mosque of Omar, the Mount of Olives, the Cave of Jeremiah, and other objects of minor interest; and, in addition to which, it is clean, well attended, and moderate in the charges.

Having rested ourselves about an hour we proceeded to the Turkish bath, near to the Mosque of Omar, but, unlike the baths we had generally visited, it was filthy and mean.*

Every one who has visited Jerusalem must have been struck with the absurdity of the localities continually pointed out by the *cicerone*; and those who have not, will have an opportunity afforded them of judging whether they are probable or not. If any of my readers should ever visit the Holy City, I recommend them to take the Bible as their guide-book, and with that in their hands, and their minds well stored with its prophecies, they will readily sift the ignorant and superstitious legends of their guides, from the truths that surround them. For the sacred volume is

"The only star,
By which the bark of man can navigate
The sea of life, and gain the coast of bliss
Securely; only star, which rose on Time,
And, in its dark and troubled billows, still,
As generations, riding swiftly by
Succeeding generations, threw a ray
Of Heaven's own light, and to the hills of God—
The everlasting hills—pointed the sinner's eye."
POLLOCK.

◆

DECOMPOSITION OF GLASS.—It is a fact not very generally known, that glass, to a certain extent, is decomposable by water. If some of it in a powdered state be triturated with distilled water, in a short time the turmeric test will indicate a portion of alkali in solution.

* Deut. xxix. 24.

† Isaiah v. 24.

* For description of Turkish baths, see vol. i. p. 78.

REVIEWS OF NEW PUBLICATIONS.

The Religion of Geology and its connected Sciences. By EDWARD HITCHCOCK, D.D., LL.D. W. Collins, Glasgow.

SINCE we commenced in the *Family Tutor* a series of papers on Popular Geology, letters have reached us, asking for information as to the relations of that science with revealed religion. We presume such inquirers need not be told that the Christian world has been much agitated by discussions on this theme, and we can hardly say that the results have been worth the pain they have caused to many an earnest spirit, tossed upon the stormy seas of doubt. We shall therefore, at once, and for all, resolutely decline all temptations to enter into so vexed a question. But, in doing this, we by no means wish to dissuade our readers from answering, as satisfactorily as they can to their own minds, whatever doubts may have accidentally sprung up. We would not even wish to be understood as condemning the abstract study of the relations in question. All truth is harmonious; and if what we believe to be two truths are found in opposition, what is our duty? Clearly, not to banish one that may seem a little less forcible than the other, and treat it ever after as non-existent, but to acknowledge ingenuously the discrepancy, keep our ultimate judgment in abeyance, and wait patiently for such farther light as may make all clear and satisfactory.

To those who wish to study the religion of geology, we do not know that we can recommend a better book than Professor Hitchcock's; not because his individual opinions are such as one must necessarily adopt, but because he raises before the mind of the reader all the various topics, with the subordinate illustrative facts that are requisite for right decision. The spirit of the author may be judged from the sentences that form his motto:—

"Science has a foundation, and so has religion; let them unite their foundations, and the basis will be broader, and they will be two compartments of one great fabric reared to the glory of God. Let the one be the outer, and the other the inner court. In the one, let all look, and admire, and adore; and in the other, let those who have

faith kneel, and pray, and praise. Let the one be the sanctuary where human learning may present its richest incense as an offering to God; and the other, the holiest of all, separated from it by a veil now rent in twain, and in which, on a blood-sprinkled mercy-seat, we pour out the love of a reconciled heart, and hear the oracles of the living God."—*M'Cosh.*

A charming Dedication precedes the volume, which we cannot but transcribe:—

"To my beloved wife.—Both gratitude and affection prompt me to dedicate these lectures to you. To your kindness and self-denying labours I have been mainly indebted for the ability and leisure to give any successful attention to scientific pursuits. Early should I have sunk under the pressure of feeble health, nervous despondency, poverty, and blighted hopes, had not your sympathies and cheering counsels sustained me. And during the last thirty years of professional labours, how little could I have done in the cause of science had you not, in a great measure, relieved me of the cares of a numerous family! Furthermore, while I have described scientific facts with the pen only, how much more vividly have they been portrayed by your pencil! And it is peculiarly appropriate that your name should be associated with mine in any literary effort where the theme is geology; since your artistic skill has done more than my voice to render that science attractive to the young men whom I have instructed. I love especially to connect your name with an effort to defend and illustrate that religion which I am sure is dearer to you than everything else. I know that you would forbid this public allusion to your labours and sacrifices, did I not send it forth to the world before it meets your eye. But I am unwilling to lose this opportunity of bearing a testimony, which both justice and affection urge me to give. In a world where much is said of female deception and inconstancy, I desire to testify that one man, at least, has placed implicit confidence in woman, and has not been disappointed. Through many chequered scenes have we passed together, both on the land and the sea, at home and in foreign countries; and now the voyage of life is almost ended. The ties of earthly affection, which have so long united us in uninterrupted harmony and happiness, will soon be sundered. But there are ties which death cannot break; and we indulge the hope that by them we shall be linked together, and to the throne of God through eternal ages.—In life and in death I abide, your affectionate husband, EDWARD HITCHCOCK."

The Dictionary of Domestic Medicine and Household Surgery. By SPENCER THOMSON, M.D., &c. London: Groombridge & Son.

WE do not know a more dangerous book, when indiscriminately used, nor a more valuable one, when put to its proper purpose, than a Family Book of Medicine and Surgery. For, while on the one hand ignorant, idle, and presumptuous persons may be induced by it to dabble in the

administration of physic, and to be eternally playing the quack to their own constitutions; on the other, those who choose to study in a serious, intelligent spirit, the limits within which we may safely and wisely minister to our own ailments, and beyond which we must not stir without professional aid, may undoubtedly do much to preserve their health in ordinary circumstances, and to co-operate with the "doctor," when it is absolutely necessary to solicit his help. We should be inclined to draw the limits thus:—Let every one study, as profoundly as possible, the essential laws of the human constitution—body and mind—for they so act and re-act on each other, that it is almost useless attempting to deal with one alone—and carry out daily, in his practical life, whatever rules that study teaches him. At first this is difficult; but those who have once felt the loss of health, and estimated its consequences upon their worldly career, and upon their tempers—to say nothing of the higher matters concerned—will see that no labour or sacrifice, however temporarily painful, can be too great for the recovery of this inestimable blessing. And once get the right *habits* fixed, and the whole work is done. He who rises early in the morning, and walks before breakfast in the fresh air, and who repeats that out-of-door exercise at other intervals during the day—who eats moderately, and only of the most nutritious and innocent food—who cleanses the skin thoroughly in every part by a vigorous abluion, and rubbing dry every twenty-four hours—who keeps under check all inordinate desires and appetites—who unbends in leisure moments the bow that has been tightly strung during the world's daily hunt after the many things it loves—who, finally, retires early to bed (the fitting close of a well-spent day) such an one will not only, in the absence of organic disease, retain all his bodily faculties in the highest state of vigour, but he will experience a sense of enjoyment in the mere fact of life itself, that few of us, alas, ever experience. We do not know that we can give this new periodical a more fitting commendation than to say, that it appears to appreciate thoroughly the importance of the prevention of disease, and to display in a very clear manner the knowledge requisite to enable any one to

commence, on his own person, this most important task. We must add, that the author has evidently prepared himself by a comprehensive perusal of all recent works, to bring the articles up to the existing state of medical, surgical, and sanatory experience. We shall look with some interest to see if the author keeps up the promise of this—his first number. Our quotation refers to one of the points we have enumerated in our rules for the maintenance of health.

"**ABLUTION.**—Washing the surface of the body regularly, is, happily, in this country at least, becoming daily more common, but it is far from being so general a habit as it ought, particularly among the working-classes, who stand most in need of it; many go from January to December without even thinking it necessary to wash more than the face or hands. The skin ought continually to be throwing off, or excreting gaseous, saline, and greasy matter, which it is necessary for the health of the body to be thrown off; but the skin cannot do this properly if caked over with perspiration and dirt, either its own, or the dust to which many are exposed in the performance of their employments. The consequence of neglect is, that much is retained in the system which ought not to be there; an additional load of duty is thrown upon other excreting organs, as the liver and kidneys; and, if they have not the power to compensate for man's own carelessness, languor, low spirits, headaches, local accumulations of blood, gout, gravel, and other diseases are the result. Fortunately, complete neglect cannot entirely stop the skin's functions, otherwise death itself must result. For the purpose of cleansing the skin, soft water ought to be used, if possible, with soap—good brown is quite the most effectual—and a thorough purification of the entire surface of body should be effected once a week, at least, with these materials; along with this, washing over the surface with simple water, and rubbing well with a rough towel every night or morning, as most convenient, will suffice to preserve a healthy state of skin. Those who are robust, and wash in the morning, ought to use cold water immediately on rising, while heat is abundant; but delicate persons cannot sustain the depression and subtraction of animal heat, which this occasions; it leaves them chilled, languid, and with impaired digestion. There are some individuals, in whom cold sponging in the morning invariably produces heart-burn and indigestion after breakfast; such ought to try the water slightly warm, or content themselves with washing only a portion of the skin each morning. If even this cannot be borne, dry friction with a rough towel or hair-glove may be substituted. After washing, it is always desirable to rub the surface thoroughly with a towel till a warm glow is produced. For washing at night, water slightly warm is always to be preferred. The feet require very frequent washing. It is surprising how insensible, even, otherwise, respectable individuals are upon this point; were it not so, they would never expose themselves to medical men in the disgusting state of dirt they frequently do. Happy are

those who can have the use of baths for the purposes of ablution, but any man who can command water and a towel need not dispense with the luxury. For the aged, frequent and thorough ablution is most requisite; the often shameful neglect of this by those who have the care of old people, is visited upon them in querulousness, and troublesome bodily ailments, which attention to the duty would have prevented."—*Part i.* p. 4.

The articles are arranged, as the title implies, in an alphabetical form, and are liberally interspersed with good wood engravings.

LUCIAN.

I. *Selections from Lucian, as read in the Irish University at Queen's College; with a much improved Lexicon, a Historical and Mythological Index, both adapted to the work; and Copious Original Notes, analytical, critical, philosophical, and explanatory;* by JAMES SHERIDAN, for many years Classical Lecturer at the Feinai-glian Institution, Luxembourg.

II. *Selections from Lucian, by J. WALKER, formerly Fellow of Trinity College, Dublin. With Copious English Notes, to which are subjoined a Mythological Index, and a much improved Lexicon, adapted to the work by HENRY EDWARDS, A. M. T. C. D.* London and Dublin: S. J. Machen.

WITH all his popularity, as exhibited in the attention paid to his works, Lucian has been anything but fortunate as regards his estimation with posterity. He deserves more than he receives. All acknowledge him to be a witty and amusing writer; all praise the purity and elegance of his style, which is not disfigured by the false ornaments and elaborate rhetoric that distinguish his contemporaries. But, then, say some, he was at once immoral and irreligious; and, although they by no means prove their case, the effect of such opinions is a certain amount of injury, easier to be understood than described, to Lucian's character and literary reputation. All this appears, in the opinion of our best critical teachers, to be founded in a superficial view of Lucian's position, time, and objects. He undertook to attack impostures of all kinds; and we should like to know when that kind of work was ever performed by timid, cautious spirits, who feel every step of ground before they trust themselves upon it. Courage and skill,

not prudence and respectable commonplace, are the qualities *especially* desiderated; and if we find the former, we must make allowance for deficiency in the latter. It has been well said that Lucian was the Aristophanes of his age; (he flourished under the two Antonines.) The quackery and imposture of the priesthood, the degrading absurdities of the superstitions then prevalent, and the nonsense, insolence, and immorality of the would-be philosophers of his age, were castigated by him with a merciless hand. He was, in consequence, often led to disclosures and to language shocking to our purer mental experience; but we must judge these things by the standard of his, not of our time. But Lucian was something higher and deeper than the mere wit, or satirist, or describer of human character. We cordially assent to the remarks by Mr. Flynn, appended to one of the above books:—

"I do not believe any ancient author has ever delivered lessons of more momentous interest to man, or has set before us more solemn instruction and humbling views of human life. In no other heathen writer is there a finer or more truthful image of the vanity and fleeting duration of man, than in the *Dialogue of Charon*. He rises a bubble on the stream of time—he is inflated for a brief season, or is no sooner formed than he dies at the moment of his birth. Not very dissimilar is the image of the Apostle, 'For what is your life? It is even a vapour, that appeareth for a little time, and then vanisheth away.' Or again, in another dialogue, what a pageant is presented to our imagination, where Fortune arranges the place, the dress, and the order of every man in the long train. Kings, warriors, the noble and the free, the bondman and the slave—all have their several parts in the great drama apportioned to them by the same irresistible power, at whose will they change dresses or position one with the other, or are altogether divested of their robes, and are dismissed from the stage on which they have strutted their little hour; and at length all distinctions are levelled in the grave!"—*Preface*.

But Lucian was "irreligious," perhaps, because he attacked the Christians in common with his brother pagans. But it would be too much to expect that every ancient teacher should be necessarily a Christian, because the doctrines of Christianity had been promulgated in his time. Lucian, probably, never spent a single serious half-hour in the examination of the new tenets, which were universally held in contempt by the aristocracy among whom he lived, and for whom chiefly he must have written. Sprung originally from the people, for his parents were persons in

humble circumstances, he became first a sculptor; then a lawyer, practising in Syria and Greece; then a teacher of rhetoric in Gaul, where he acquired wealth; then an independent traveller, seeking information; then an Athenian resident; and lastly, an official in Egypt under the Emperor Commodus. The tragic story of his death is probably a false one: it states that he was torn to pieces by wild dogs for having attacked Christianity, and is supposed to be some pious fraud of a later writer, hostile to Lucian's religious views.

Two editions at the same time before us for examination, attest that popularity of which we spoke. Both are founded upon Walker's *Book of Selections*, and have the same Greek text, lexicon, and alphabetical catalogue of words in the lexicon, but with entirely different notes. The publisher of both, claims, we believe, for the edition with Sheridan's notes, the character of being one of the best, if not the very best, edited Greek school-books ever published. It would require a more lengthened examination than we can pretend to say we have instituted, to affirm or deny this claim; but the opinions of able scholars are highly in its favour, and if our approval can be of any additional value, we do cheerfully give it. The business-like character of the notes to all such works, and of which they are the chief value, renders them generally unsuitable for quotation; but we extract one upon the famous

ELEUSINIAN MYSTERIES.

"There is nothing in pagan antiquity more celebrated than the feast of Ceres Eleusina. The ceremonies of this festival were called, by way of eminence, 'the Mysteries.' They were said to have been instituted by Ceres herself, who, coming to Eleusis, a small town of Attica, in search of her daughter Proserpine, whom Pluto had carried away, and finding the country afflicted with famine, invented corn as a remedy for the inhabitants; and also instructed them in the principles of probity, charity, civility, and humanity, whence her mysteries were called *Θεσμοφορία* and in Latin *Initia*. These mysteries were divided into the less and the greater, the former serving as a preparation for the latter. Athenians only were admitted to them, all strangers being absolutely excluded; but persons of every age and condition, and of both sexes, had a right to be received. The Athenians initiated their children into them at a very early age, judging it criminal to let them die without such an advantage. Those who demanded to be initiated were obliged, before their reception, to purify themselves in the lesser mysteries, by bathing in the river Ilyssus, which flowed through Athens, offering sacrifices, &c. When the time for their

initiation arrived, they were brought to the temple, and on this occasion wonderful things passed, the ceremony being performed at night, to inspire greater reverence and terror. Visions were seen, voices heard, thunder, earthquakes, &c.; whilst the person admitted, stupified and trembling, heard the mysterious volumes read to him. The president in this ceremony was called Hierophantes: he wore a peculiar dress, and was not allowed to marry. The first who served in this function was Eumolpus, from whom his successors were called Eumolpidae. He had three colleagues: one who carried a torch, in imitation of Ceres, who, having lighted a torch at the fire of Mount Ætna, wandered about from place to place in search of her daughter; another a herald (*κρυψς*), whose office it was to pronounce certain mysterious words; and a third to attend at the altar. This feast, which was celebrated every fifth year, was of nine days' continuance, and while it lasted no one could be arrested. It was a capital crime to divulge the secrets and mysteries of it. Its celebration was never interrupted, except on the taking of Thebes by Alexander; and was continued down to Theodosius the Great, who is supposed to have finally suppressed it, as well as all the rest of the pagan solemnities."

The History of England, from the earliest period to the present time, adapted for youths, schools, and families. By Miss CORNER, author of the "History of Rome," &c. Twenty-first Thousand. London: T. Dean & Son.

Miss CORNER has achieved a widely extended reputation for her various historical works, which now include in their subject matter, nearly, if not quite the whole, of the kingdoms of Europe, to say nothing of China and India. A glance at the present volume reveals the qualities to which such a success may be ascribed. She possesses a clear, easy style of narrative, and has the good sense to shun the old conventional notions of history, which made kings and warriors, statesmen and diplomatists, their staple; and thought it beneath the dignity of the historic muse to trouble herself about the condition of the people at large. Miss Corner does not write the history of her country in this fashion, but weaves into her record whatever is most salient in the manners and customs, the fortunes and progress of those by and for whom alone, kings, warriors, statesmen, and diplomatists really exist. We may select, as a fair example of these qualities, Miss Corner's account of England in the fourteenth century:—

"The gradual abolition of slavery throughout England had produced the most happy results. Most of those who were emancipated applied them-

selves to trades, manufactures, and husbandry; and instead of a despised race of bondmen, became a free and industrious class of tradesmen, artisans, and labourers, who were no longer separated from their fellow men by any degrading distinction. Edward the Third had freed all the serfs on his manors, when he wanted to raise money for the invasion of France; but slavery was not abolished by law, therefore, most of the nobles still had serfs and vassals on their lands. We may judge of the little freedom that existed in England at this period, by the mode in which Edward the Third procured workmen to build the castle at Windsor. Instead of employing such labourers as he wanted, at regular wages, he issued his royal mandate, that every county in England should send him a specified number of carpenters, masons, and other artificers, to perform the work, as though he had been raising an army by conscription.

"The working classes in those days were generally in a condition better than that in which they are now; for although their wages were not more than three-pence a day, that sum would purchase as much meat and bread as four shillings will buy at the present time; consequently, the humble cottages of the poor presented a degree of comfort, plenty, and cheerfulness scarcely met with at present among the agricultural labourers: but as wearing apparel was not cheap in proportion, they were more rudely clad than the same class of people are in the present day. No man was allowed to work anywhere but in the neighbourhood of his own village, except those who lived on the borders of Wales or Scotland, and the inhabitants of Derbyshire, Lancashire, and Staffordshire, who, from time immemorial, had enjoyed the privilege of seeking employment in any part of the country.

"There were no shops yet in the country towns, which were but poor places, the best houses in them being rough wooden buildings, with latticed windows; but the mansions of the great were beginning to be built in a very handsome style, adorned with painted glass windows, and the walls and ceilings also painted to imitate tapestry, or hung w. ' that costly material. The chairs and tables were of carved oak, and bedsteads were now commonly used, but with the exception of those in palaces and noblemen's houses, they were made like a child's crib. The court-yards of most great houses and castles had galleries round them, for the convenience of witnessing the exhibitions of travelling actors who were in the habit of roaming about the country, carrying with them materials for erecting a temporary stage at any place where they might stop. Their performances were called mysteries, the subjects being usually taken from Scripture history, and the legends of the saints; and as there were no theatres at that time, these entertainments were very much encouraged.

"Mumming was another favourite amusement; it consisted of a kind of masquerading, of which I shall have occasion to speak hereafter, in telling how Christmas was kept in the olden time.

"Tournaments were still held in England, as well as other chivalric amusements, called passages of arms, which were of various kinds; as, for example, a baron would send out a herald to proclaim a passage of arms to be held on a given day, before his castle gate, to which all knights inclined to exhibit their valour were invited to repair.

Sometimes, a number of knights would join together, and make known that they were ready to encounter an equal number of knightly combatants; and sometimes a single knight gave out that he was prepared to fight in succession with all who chose to break a lance with him. It was the glory of these knights to overcome, one after another, every foe that presented himself, until fatigue obliged them to give up the contest."—Pp. 105-7.

Questions on all the chief facts contained in the history are appended at the close. And we may mention, as a proof the indefatigable zeal of author and publisher to keep up the history close to our own time, that we find, already, the Great Exhibition treated as an historical fact in Miss Corner's book. The recent gold discoveries of Australia are also spoken of.

The Philosopher's Stone of Business Figures.

Paisley: W. Anderson.

In this little pamphlet, the author, David Stirrat, a hand-loom weaver of Paisley, announces a newly-discovered method of casting up the price of goods, by the aid of small tables. The calculation of interest is also provided for, by a plan equally new, short, and simple. The author has an eye, it appears, to the vast quantities of Californian and other gold, that must shortly be expected to come in upon us, in an auriferous deluge; and invents in time a new method to calculate it. He is not at all bashful. Thus he says "Napier's creative invention was only useful to a few Sir Isaac Newtons, this will be accessible and useful to the million." But David Stirrat's publisher is, probably, responsible for this trumpet-blowing. That gentleman, indeed, seems to be a bit of a humourist, and desires to relieve a dry subject by some agreeable facetiæ. He even grows poetical—

"Railway speed

Is realized here indeed.

"Practice is from this method thrown,
And Aliquot is quite unknown;
Interest here completely gutted;
Reduction up and down is routed."

Or,

"Base Practice here is fairly routed,
Reduction it is likewise scouted,
And poor Interest standing quaking,
While its bowels out are taking."
"PUB."

And so, again, when the printer, on receiving the manuscript, said, "Man, that's an unco, bare-like thing; can ye no' write

two or three lines yoursel' to put i' the face o't?" he proceeds at once to write an Apology, Preamble, Account of the Author, &c., and which are terse, amusing, and quite to the purpose.

And now to David Stirrat's new Tables. He chiefly relies on what he calls the first and second, which, therefore, we present to the readers of the *Family Tutor*, each accompanied with the proper explanations.

TABLE FIRST.			TABLE SECOND.		
d.	s.	d.	s.	d.	£. s. d.
1 Log.	1	0	1 0 Log.	1	0 0
$\frac{3}{4}$ "	0	9	0 *1 "	0	1 8
$\frac{1}{2}$ "	0	6	0 $\frac{3}{4}$ "	0	1 3
$\frac{1}{4}$ "	0	3	0 $\frac{1}{2}$ "	0	0 10
$\frac{1}{8}$ "	0	$1\frac{1}{2}$	0 $\frac{1}{4}$ "	0	0 5
$\frac{1}{16}$ "	0	$0\frac{3}{4}$	0 $\frac{1}{8}$ "	0	0 $2\frac{1}{2}$
6 Log.	$\frac{1}{2}$		10 Log.	$\frac{1}{2}$	
12 "	1		20 "	1	
24 "	2		40 "	2	
36 "	3		60 "	3	
48 "	4		80 "	4	
60 "	5		100 "	5	
72 "	6		120 "	6	
84 "	7		140 "	7	
96 "	8		160 "	8	
108 "	9		180 "	9	
120 "	10		200 "	10	
132 "	11		220 "	11	
144 "	12		240 "	12	

These Tables, it will be seen, are divided into two parts. The lower contains the "Log" (logarithm) numbers; and the upper enables us to find the log of any product. Both are to be learnt by heart, and then you may calculate at railroad express rate. The general rule is summed up thus:—

"Multiply the Price by the Log of the Number, and write the Log of the Product; then plus the Increment, or minus Decrement, and it is done."

Now for examples of the working:—

"EXAMPLE ON TABLE FIRST.

48 Yards at 7d. per yard.

†P × 4 Log N = £1 8 0

* 2d. Log 3s. 4d.—3d. Log 5s.—4d. Log 6s. 8d.—5d. Log 8s. 4d.—6d. Log 10s.—7d. Log 11s. 8d.—8d. Log 13s. 4d.—9d. Log 15s.—10d. Log 16s. 8d.—11d. Log 18s. 4d.

† Signifies the price multiplied by 4 Log Number = £1 8s.

Here I multiply 7d. the price of 1 yard, by 4 the Log of 48. Thus—4 times 7d. is 28d., and as the Log of 1d. is 1s., therefore 28d. is 28s. or £1 8s. the price of 48 yards."

We now proceed to an

"EXAMPLE ON TABLE SECOND.

40 Yards at 3s. 1d. per yard.

P × 2 Log N = £6 3 4

"Here I multiply 3s. 1d. the price of 1 yard, by 2, the Log of 40. Thus—2 times 3s. 1d. is 6s. 2d., and as the Log of 1s. is £1, and 2d. is 3s. 4d., therefore 6s. 2d. is £6 3s. 4d. the price of 40 yards."

We conclude with David Stirrat's mode of calculating interest:—

"To find the interest on any sum, for days, at any rate per cent.

"RULE.—Multiply the principal, days, and double the rate together; reject the units' and tens' place of the product; then $\frac{1}{3}$ of the remainder is the interest in pence, but deduct a penny for each six shillings.*

EXAMPLE.

"Find the interest on £300 for 9 days at 4 per cent.

300
9
—
2700
8

3)216 | 00

72d. = 6s. minus 1d.

Ans. 5s. 11d."

We know not whether these tables are new, but assuredly they are highly ingenious, and, for aught we can see, likely to be of real service in the every-day operations of business.

The Vegetable Branch of Nature's Chemistry.
A Lecture by the Rev. FREDERIC DUSAUTOY, A.M. London: James Ridgway.

LECTURING appears to have been under eclipse of late. We are sorry for this, for although we readily acknowledge that the earnest student, who knows what he wants,

* One penny off each six shillings is three one-third pence off each £1 of interest.

can never get knowledge as satisfactorily from the platform and the crowded theatre, as from books in the solitude of his chamber, how few of us are there to whom the latter description can properly apply! In all other cases, the stimulus is valuable; those who listen are interested, if it be only from seeing so many about them interested also; and he who speaks, has been naturally impelled to increased exertions to bring up his own mind and knowledge to the level of the duty he has undertaken. Perhaps, however, lecturing will again become fashionable, now that lords are becoming lecturers. Two or three cases have lately attracted our attention, where noblemen have followed the example of the excellent Earl of Carlisle (late Lord Morpeth).

Under a rather fanciful title, the Rev. Mr. Dusautoy has collected together many informing and striking facts, a knowledge of which cannot be too widely disseminated, seeing that they are of so suggestive a character that the dulllest apprehensions must, one would suppose, desire to know more of subjects that, even on a superficial glance, yield so much to attract him. Here is an example, illustrating the cause of that rich variety of colour, which tells of the approach of leafless winter.

THE BEAUTY OF THE DYING LEAF.

"As the tissues or cells are gradually clogged by particles which cannot pass away, the circulation of the sap is hindered, before it becomes finally stopped. Hence, the leaves perform their allotted functions at first most imperfectly, before they finally cease. This derangement introduces a chemical change, and, probably, according to the nature of the acid generated, or of the fluid it meets with, so is the colour of the leaf. It is considered that light also has much to do with the chemical alteration in the green colouring matter. The beautiful green of the chlorophyll is transformed in the leaf of the Virginian creeper, of the sumach, of the ribes, and of the vine, into red. In the beech-tree and the maple we admire the orange; in the woodbine, the blue; in the cornel-tree, the purple; and in the lilac, the black. In the lofty elm-tree the yellow makes its beauteous appearance: while, in the British oak, we behold an emblem of greater durability, in the bright shade of brown. And again, the leaves of the red beech pass through many changes of colour before they reach their bright pale yellow. Such is the result of a more particular investigation; while the more general appearance of the dying foliage is that of a reddish brown or a dull yellow. One remarkable phenomenon must not be overlooked. The colour of the leaves, in autumn, frequently answers to that of the fruit borne. Thus, while vines which bear blue grapes have red leaves, such

as bear white grapes have generally yellow leaves. But there is no relation between the colour of the flower and that of the autumnal leaf."

A religious spirit pervades the lecture, and is, perhaps, allowed too frequently to exhibit itself in direct admonition, considering the occasion. One of its most felicitous applications of scientific truth to the service of religious faith, is contained in the following passage:—

THE HUMAN TABERNACLE.

"It is a well-ascertained fact that, within five years at the uttermost, the entire animal frame is changed, so that not even a minute particle of the old body remains. How clearly does this prove that the body is only the Tabernacle, in which a spiritual and intellectual being dwells, who is destined for another and an eternal state. And how puerile to the philosopher are those arguments of the infidel, against the resurrection of the body, which he draws from its return to the dust! Every day a small particle of our animal frame is thus dying and returning to its native dust; and, although many of us have thus gradually put off our old Tabernacles again and again, yet we are assured that the tenants are the same, though their dwellings have been changed."

LIGHT FROM THE OYSTER SHELL.—The luminous appearance sometimes to be seen in the shells of oysters is produced by an animalcule, which can emit or conceal its light at will; and sometimes its lustre is so bright, as to be discoverable even in open daylight, especially on being touched or disturbed. Its light is bluish like that of the glow-worm.

SYMPATHY, OR INFLUENCE OF PENDULUMS ON EACH OTHER.—It is now nearly a century since it was known, that when two clocks are in action upon the same shelf, they will disturb each other; that the pendulum of the one will stop that of the other; and that the pendulum stopped will, after a while, resume its vibration, and, in its turn, stop that of the other clock. When two clocks are placed near to each other, in cases very slightly fixed, or when they stand on the boards of a floor, it has been long known that they will affect, a little, each other's pendulum. It has been observed, that two clocks resting against the same rail, which agreed to a second for several days, varied one minute thirty-six seconds in twenty-four hours when separated. The slower, having a longer pendulum, set the other in motion in 16½ minutes, and stopped itself in 36¾ minutes.

THE BIRD TALISMAN.

AN EASTERN TALE.

FOR THE TUTOR'S YOUNGER PUPILS.

(Continued from page 52.)

It was now evening, and the daws having gathered some figs and grapes for supper, the little princess lay down to sleep on her bed of the night before. She felt very unhappy at being no longer able to converse with her dear birds, but she soon cried

herself to sleep. In the morning they all set out again to search for the ring. While they were thus employed, the two daws came suddenly upon a soldier lying under a tree. "Here is a man!" cried one—"fly back and warn the princess!" "Who goes there?" cried the soldier, jumping up; and as he rose, the daws saw the lost ring glittering on his finger. Immediately the charm worked, and the daws were obliged to answer the soldier's question. "We are two unfortunate daws, at your service,"



said they. The soldier was astonished to hear the birds talk, and exclaimed—"How is this? How can birds like you talk?" "Sir," replied one of them, "you have a magic ring on your finger, which enables you to understand what we say, and compels us to answer your questions." "Does it?" said the soldier, "then tell me what princess you were talking of, just now?" "The Princess of Cashmere," answered the daw. "Why there is a reward of fifty pieces of gold for whoever finds her!" said the soldier—"Is she anywhere hereabouts?" The poor daws were very unwilling to betray the princess, but they could not resist the magic of the ring; so they were forced to confess that the princess was close at hand, and the soldier immediately proceeded to look for, and soon found her. He seized her by the arm, and, in spite of her tears and cries, dragged her along the path, the three birds following with many doleful cries. By and bye, they reached

the shore of the lake, where they found a boat moored. Into this the princess was forced to go, and the soldier getting in himself, the parrot managed to scramble in, and hid herself under one of the seats. The soldier rowed the boat across the lake, and the daws flew overhead. They landed near the postern door of the palace, and knocking at the door, it was opened by Baboof, who grinned horribly when he saw the princess, and led them immediately to the queen's apartment, while the three birds concealed themselves in the garden.

The queen gave the soldier the promised reward, and ordered Baboof to lock the princess up in her own room, and to set guards opposite both the door and the windows, to prevent her escaping again. She then inquired of the soldier how he had found the princess; and he told her how he had found a magic ring in the wood, which enabled him to understand the language of birds; and how he had learnt

from the daws where the princess was. As soon as the queen heard of the magic ring, she offered the soldier fifty more pieces of gold for it, which he gladly accepted, and went his way.

The queen was delighted at getting possession of the magic ring—for she had often heard of it in her youth, and knew that it formerly belonged to the famous enchanter, Moozuffer, and that, at his death, it had been carried away by the birds, and concealed, that no other person might rule them as Moozuffer had ruled them in his lifetime, by means of this ring. Looking out of the window, she saw the two daws sitting mournfully on a tree in the garden, and holding up the ring to them, called them to her, and ordered them to go to the forest on the other side of the lake, in the midst of which they would find an immense rock, with perpendicular sides. At the foot of this rock, they would find a pomegranate-tree growing, in the trunk of

which was inclosed a living toad. She told the daws to bring her one of the pomegranates from this tree; and she told them, also, to swallow a pomegranate seed each, for the seeds of that pomegranate were an antidote to every poison, and unless they swallowed one, they would perish in the next service she required of them, which was to fly up to the top of the rock, and bring her a piece of the gum of a poisonous tree which grew there. The two daws flew away to the forest, and soon found the pomegranate-tree growing at the foot of the rock. They tapped at the trunk with their bills, and listened, and heard the toad croak inside the tree. They then swallowed some of the seeds that lay scattered under the tree, and having gathered each a pomegranate, they flew to the top of the rock, which they found quite bare of all plants, or living things, and scattered over with the skeletons of birds, which had been poisoned by the smell of the poison-tree,



in flying over the rock. On the highest point of the rock grew one small, stunted tree, from the bark of which dropped a black-looking gum. One of the daws picked up a piece of this gum, and then they both flew back to the palace, carrying the gum and the two pomegranates. One of the pomegranates they dropped amongst a thicket of bushes in the garden, and the other they carried, together with the gum, to the queen, who immediately swallowed one of the pomegranate-seeds herself, and gave another to Baboof, who was with her, to prevent being poisoned by the smell of

the gum, which she then put into a golden box, and sealed it up.

As soon as the daws left the queen, they flew straight to the little princess's window, where they found the parrot. They told her what they had done about the poisonous gum and the pomegranates, and they all agreed that a new attempt would be made to poison the princess; and to be prepared for this, the daws went and fetched the pomegranate which they had dropped in the garden. The parrot pecked a hole in it, and ate one of the seeds herself, and then carried the pomegranate to the prin-

cess, who was sitting crying in a corner, and made signs to her to eat one of the seeds. The princess did not like to do this, for the pomegranate was exactly of the colour of the skin of a toad, and did not look at all tempting; but the parrot made so many signs, and coaxed the princess so, that she at last swallowed one of the seeds, and the parrot hid the pomegranate under the bed. She had hardly done so, and, hearing the key turned in the door, concealed herself also, when Baboof entered, with a loaf of bread and a jar of water, which he put on a table, and went out. As soon as he was gone, the parrot came from under the bed. The princess was very hungry and thirsty, but was afraid to eat or drink, though the parrot, knowing that the pomegranate-seed was an antidote to the poison, did all she could by signs to encourage the princess to eat. While the parrot was making a great fuss, pecking the bread, and sipping the water, and making all sorts of impatient noises, the two daws flew in at the window, with the magic ring in one of their bills. As soon as the princess touched the ring, she immediately understood what the birds said, and they told her how they had recovered the ring—that when Baboof came in with the loaf, they had flown out of the window, and perching in a tree opposite the queen's window, they had seen the queen sitting there, playing with her little boy, who pulled the ring off her finger, and rolled it along the window-seat, and at last let it fall out of the window; that the queen immediately left the window, to send one of her slaves to pick up the ring; but before she could do so, and without being seen by any one, the daws picked it up, and brought it to the princess. Great was her joy at being again able to talk with her birds, and when they had told her all about the poisonous gum, and the antidote, she was no longer afraid to eat the bread, and drink the water, and after making a hearty supper she went to bed.

In the morning, Baboof came to see whether the princess was dead, and was much surprised to find she was alive, though she had eaten so much of the poisoned bread. He said nothing, however, but went down to tell the queen, who was in the garden, looking again for the ring, under the window from which the baby had

dropped it. The parrot told one of the daws to go and listen to what they said; and accordingly the daw went silyly, and hid himself in a bush close to the queen, where he could hear all that passed. The queen was very much surprised at the princess escaping the effects of the poison, and said she must have some talisman, or charm, about her. "However," said she, "to-night you shall take her to the balcony that looks on the lake, and throw her into the water, with a stone round her neck; and in the morning we will pretend she has died in the night, and have a false funeral, and a coffin filled with rubbish, which we will bury."

The daw flew back to tell this dreadful news to his companions, and they consulted together without telling the princess, for fear of frightening her, at first; but when they had settled their plans, they then told her not to be alarmed, but to leave everything to them, and they would save her life.

There lived just outside the palace walls, in a hut on the shore of the lake, a poor fisherman, who used to spread his nets in the water, below the walls of the palace; and the little princess had often sat in the balcony with her attendants, and watched him fishing, and often used to buy his fish of him, and draw it up with a basket and string, and let down the money in the same way, so that she had made quite a friendship with the old man. The parrot used to be of these parties—for she was very fond of fish—and the old fisherman and she were on very good terms. To this old fisherman's hut the parrot and the two daws now flew, taking the ring with them, and putting the ring on the old man's finger, so that he could understand what she said, the parrot told him that his little patroness was in need of his assistance to save her life. The old man immediately said he would do anything for her, even at the risk of his own life. He was then told the whole state of affairs, and promised to obey all the parrot's orders.

The parrot and the old fisherman settled between them what was best to be done to save the princess. The old man said that he would lay his nets under the balcony, so as to catch the princess as soon as she should be thrown into the water; and that she might float on the surface instead of

sinking, he hit on the following plan:—He took a number of corks from an old net, and told the parrot and the two daws to fly with them, one by one, to the princess's room, and tell her to cut them into small pieces, and string them on a piece of twine, and wrap this round and round her body, so as to form a sort of jacket, by means of which she would be able to float in the water, in spite of the weight of the stone that Baboof and the queen had talked of tying round her neck. But to make sure, the fisherman sent the princess a little sharp knife, by means of the parrot, and sent her word to keep it concealed under her sleeves, to cut away the stone from her neck. When all this was prepared and settled, the parrot flew back with the ring and one of the corks to the princess, and the daws followed with as many pieces of cork as they could carry, and they all three flew backwards and forwards with the corks till they had brought as many as would be wanted. The little princess cut the corks in pieces, and strung them on a piece of strong twine which the fisherman sent her; and she obeyed the directions brought by the parrot—wrapping the corks round and round her body, and concealing them under her pelisse. By the time this was done, it began to grow dark, and by and bye Baboof made his appearance, and told the princess she must come with him. He led her by the hand through the garden, and up to the balcony overlooking the lake; and as they passed through the garden he picked up a large stone, and wrapped it in a handkerchief; and when they reached the balcony he suddenly tied the handkerchief round her neck, putting his hand on her mouth to prevent her crying out, and at the same time lifted her over the balustrade, and threw her into the water. But she was prepared for this, and in an instant, as he was lifting her up, she cut the handkerchief with the knife, so that the stone fell into the water at the same time with herself, and sank to the bottom, while she floated by means of her cork jacket. It was quite dark, and Baboof hearing the splash, and then all being still, thought she had sunk to the bottom, and left the balcony to tell the queen what he had done. In the meantime, the old fisherman was lying concealed with his boat under the projection of the balcony, and had spread his net so

that whatever fell from the balcony should be within it. As soon, therefore, as he heard the splash, he began quietly to draw in his net, and soon brought the floating princess to the side of his boat, and lifted her in. He then rowed quietly away to his own hut, and landed with the princess. He showed her into a little room, where a comfortable bed was prepared for her, and where she found the parrot and the two daws already arrived. They had accompanied the princess in the dark to the balcony, and when they had ascertained she was safe in the boat, they had flown on before to the fisherman's hut. The little princess went to bed immediately, for her clothes were all wet; and as soon as she was in bed the old man brought her a plate of bread and fish for her supper, after eating which, and giving some to her three birds, she fell asleep.

In the morning, the old man went a fishing, leaving her locked up in the hut, and the two daws flew to the palace to get intelligence. They found everything in a bustle in the palace, with a grand funeral preparing, and looking in at the window of the princess's room, they saw a magnificent coffin lying on the bed, with wax tapers all round it, and the attendants in deep mourning. They flew back to the princess with this news, and the parrot said to her—"Now, my dear, you may rest here in peace till we can get an opportunity of escaping to your grandfather. The queen thinks you are drowned; and I am sure we may trust the old fisherman." As she said this, the old man came in with a great basket of fish, of which he chose the nicest for the princess to eat, and took out the rest to sell in the city. With the money he got for the fish he bought food and other necessities, and enough cloth to make the princess a complete suit of common clothes, which she cut out and made for herself.

(To be continued.)

PRINTING.—Every octavo page of Steeven's edition of Shakspeare, including text and notes, contains in the type 2,680 distinct pieces of metal, which, in each form for printing *one sheet*, would give a total of about 43,000. The misplacing any one of these would inevitably cause a blunder.

26—Calculation. H. F. R.—In semi-civilized states, small stones were used as counters; hence the word "calculation," derived from *calculus*, a little pebble.

27—Rosicrucius. P. O.—The anecdote of the opening of the tomb is to be found in No. 379 of the *Spectator*. It is just possible that the ideas about the perpetual lamps of the ancients arose from the circumstance that inflammable or phosphorescent vapours have been found in tombs.

28—Queen Elizabeth. S. S.—The copy-book in which the "Ladye Elizabeth" learned to write under the tuition of Roger Ascham, is to be found in the Bodleian Library at Oxford. With it is preserved also the paper on which she tried her pens; which she usually did by writing the name of her brother Edward.

29—Astrology. C. H.—Some of the persons most highly celebrated for piety have believed in this silly superstition. Charles I. consulted Lilly the magician. In Burnet's *History of his own Times*, a story is given which shows that Charles II. was bigoted to judicial astrology. Astrology greatly flourished in the times of the civil wars. Those who are interested we would refer to Lilly's work, entitled *Christian Astrology, modestly treated*. Second edition. 1659.

30—Portraits in Stones. C. N.—There are many agates to be found where the lines appear to be sketches of trees, animals, and even of human faces. We have never seen a specimen of the latter which had not been assisted by art, or in which the lineaments could be distinctly traced by us. Perhaps this may be rather the want of ability in ourselves, than a deficiency in the markings of the stone. A black stone in the British Museum is said to bear a natural portrait of Chaucer. Of the fact, one of our poets has given us the following graceful memorandum:—

"Helvetia's rocks—Sabrina's waves,
Still many a shining pebble bear,
Where Nature's studious hand engraves
The perfect form, and leaves it there."

31—Numerals. H. T. R.—The numerical figures, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, are upon good authority believed to be of Indian origin. They were not used in Germany till the beginning of the fourth century, nor in Russia until the beginning of the last century. Before the use of these figures, the Roman numerals or alphabetic characters were used. [See *Le Nouveau Traité Diplomatique*.] Men in the first instance counted with their fingers; and hence four simple strokes stand for four. Five was represented by a rude drawing of the left hand with the back towards the counter, viz. V. Two V's together counted ten, and made the figure X. The hundred was marked by the letter C, which stood for the Latin word *centum*. The latter form of numerical notation is stated still to be preserved in the accounts of the English Exchequer.

32—Title-pages. E. S.—Nothing is more difficult for an author than to find a good title for his book. This difficulty is increased in periodical literature. The pioneers in the race of composition, having great choice, take possession of the best. Example—The *Tatler*, the *Spectator*, &c. The importance of a good title can be easily proved. The English novel under the title of *The Champion of Virtue*, could find no readers; but the same work, under the happier name of *The Old English Baron*, went through several editions. As speci-

mens of extraordinary titles, we might quote a pageful of the samples of taste of the old fanatics, such as "The Shop of the Spiritual Apothecary," "The Bank of Faith," &c.; but the following seems to exceed all its compeers, and may therefore be considered their archetype:—"Fine Biscuits baked in the Oven of Charity, carefully conserved for the Chickens of the Church, the Sparrows of the Spirit, and the sweet Swallows of Salvation."

33—Music used in Medicine. M. R. N.—Our correspondent will find the information which she seeks in Dr. Burney's *History of Music*, under the head of "On the medicinal powers attributed to Music by the ancients." A treatise on the same subject was printed by the proprietor of the *Gentleman's Magazine*, for the Rev Dr. Mitchell, who wrote under the title of Michael Gaspar. A beautiful description of the effects of music on a wounded mind will be found in Byron's exquisite verses on the death of Haidee. Many of our pupils will remember that Homer states how the Greeks used music to check the plague. David's harp was used to heal the madness of Saul. Æsculapius is said to have used music medicinally. Boyle and Shakspeare allude to it as useful in mental diseases. Some curious relations have been received in reference to the sanitary effects of music on persons bitten by the tarantula. Farinelli the singer is said to have cured the king of Spain; and many similar cases have been related. [See the writings of Sir William Temple.]

34—Caligraphic Curiosities. D. B.—We are no admirers of useless curiosities, which have wasted much time to no purpose. Our correspondent has enclosed a card having the Lord's Prayer written within a circle of the size of a fourpenny-piece. Pliny says that Cicero once saw the *Iliad* of Homer in a nut-shell. Ælian notices an artist who wrote a distich in letters of gold, which he enclosed in the rind of a grain of corn. All this appears to us a species of curious idleness, justifying the definition of genius—that "it can do anything in life but what is useful." In the Harleian MSS. an account is given of the work of one Peter Bales, who enclosed a written Bible in a walnut no bigger than an egg. In the library at St. John's College, Oxford, we remember having seen a portrait of one of our kings, the lines in the drawing of which are formed of minutely-written sentences; we were told that the portrait contained the Psalms, the Nicene Creed, and the Lord's Prayer. A similarly constructed portrait of Queen Anne exists in the British Museum.

35—Customs—Stays, Cravats. F. F.—It is not logical to attempt to defend one absurdity by another. It is no excuse for the wearing of stays to accuse the gentlemen of choking themselves with starched cravats. All the wicked perversions of nature might find a ready excuse by each nation discovering an equally absurd habit. The ladies in Japan gild their teeth; the Indians paint them red; the Malays prefer to dye them black. In Greenland, the women dye their faces yellow, while, in England, they paint them white; in the South-sea Islands they cover them with scars, and in Africa keep them bright with oils and grease. The Chinese squeeze their feet, and the English their lungs, into the smallest possible compass. In some countries, the noses of the babies are pressed flat; in others, they are pinched sharp.

The Persians and English have an aversion to red hair, and dye their locks; on the other hand, the Turks warmly admire that colour. The Chinese and English pluck, cut, and paint their eyelashes and eyebrows, while the Patagonians often shave them off. The Persian lady dyes her nails yellow, while the European scrapes and oils hers to keep them fresh-coloured and transparent. Some nations ring their noses, some their lips, and some their ears.

36—Eccentric Preachers. L. A. M.—In the fourteenth, fifteenth, and sixteenth centuries, a set of these men existed; and the class alluded to are but poor imitators of their simple predecessors, who adapted their rude eloquence to their hearers. The quaintness of some of the modern school is quite out of place in a majority of instances, and at variance with the reverence usually felt in a place of worship. Of the old school, Oliver Mailard, who lived and preached in 1502, is said to have been amongst the most remarkable. We remember a singular address to the ladies of his congregation, in which he charges to their love of dress a great proportion of the sins of the whole community. Michael Menot, who died in 1518, belonged to the same class. Bishop Latimer was accustomed to use strange phrases in his sermons; and the celebrated Father Andrie (well described by the author of *Guerre des Auteurs Anciens et Modernes*) used satire, quirks, and even puns, in the pulpit. Whitfield, also, resorted to eccentric modes of teaching, by references to familiar and occasionally ignoble things. We observe that, in Charles II.'s time, the preachers were expected to introduce some humour into their discourses. The habit was followed by Sterne and South; the sermons of the latter very frequently sparkle with wit and fun.

37—Art-impostures. H. G.—Our correspondent, alluding to the recent discovery of the statue of the *Athlete*, in Rome, remarks that it may be the work of a modern artist. This, if not impossible, is highly improbable; inasmuch as it appears from the accounts given, that no modern artist could have deposited so large a work in such a situation without making enormous excavations, such as would have elicited public observation. Nevertheless, it is not to be denied that such art-impostures have been frequently practised. It is related that Michael Angelo sculptured a sleeping Cupid, of which having broken off an arm, he buried the statue in a place where he knew it would be found. It was sold by the *discoverer* to the Cardinal of St. George, to whom Michael Angelo discovered the whole mystery, by joining to the Cupid the arm which he had preserved. Peter Mignard so closely imitated the style of Guido, that an assembly of critics refused to believe that a deception had been practised, until it was proved by the artist, who, rubbing away a portion of the supposed Guido, showed another underneath. Bernard Picart's engravings after the old masters, afterwards published under the title of the *Imposteurs Innocens*, are well known to the curious. Goltzius successfully imitated the works of Albert Durer, as a rebuke to the false taste of his times. Literary critics have been as readily deceived as those of art; as instances, we might mention Muretus's deception of Scaliger, the Abbé Regnier's imitation of Petrarch, Commire's imitation of Phædrus, Sigonius's parody of the style of Cicero, and Burke's *Vindication of Natural Society*, which,

from its close resemblance, was supposed for a long time to be the composition of Lord Bolingbroke.

38—Fashion. T. A.—The origin of any peculiar fashion may commonly be traced to the endeavour to conceal some deformity of its inventor; hence, cushions, ruffs, hoops, and other monstrous devices. Patches were introduced in the reign of Edward VI., by a foreign lady, who, in this manner, covered a scar upon her neck. A deformity on the shoulder of the Dauphin of France led to the invention of full-bottomed wigs. Long coats came into fashion when Charles VII. of France endeavoured to conceal his ill-formed legs by garments of that kind; while Henry Plantagenet, Duke of Anjou, gave currency to long-pointed shoes by the deformity of one of his feet. When Francis I. was compelled to wear his hair short—owing to a wound in the head, all the court were cropped. The aristocracy usually originate fashions, and these the *bourgeoisie* continually endeavour to follow and imitate: no sooner have they done so, than the richer sections of society invent a new fashion, in which their less opulent admirers ruin themselves in their continual efforts at imitation. The hair, the beard, and the hat, have been constant subjects of fashionable change among *men*, whose garments have undergone more radical changes than those of *women*; the former are more free from the slavery of fashion, while the latter consider its dicta absolute. In Gray's *Hudibras*, (vol. i. p. 300,) will be found an extract from Taylor, the water poet, in which the great variety of beards in his time is described. The beard gradually dwindled under the two Charleses, and became extinct under James II., because at that period there was a member of the French royal family who was naturally beardless. In the reign of William and Mary even the children wore wigs. Among the odd fashions we have read of, is that which prevailed in the reign of Henry III. of France, when all the world carried comfit-boxes, which were opened with the gravity which now pertains to the snuff-box. The Duke of Guise, when shot at Blois, died with his box of comfits in his hand. Fashions have been considered occasionally so to interfere with public morality as to call forth edicts of the legislature, as in the time of Charles V. of France, and our own Elizabeth,—who, however, might not have been expected to be sensitive on such a point. While warring against extravagance in dress, she herself was in the extreme of fashions, borrowed from other countries; and it is related that she left no less than three thousand different habits in her wardrobe when she died. In Chaucer's *Parsones Tale*, the poet has delineated the grotesque and costly fashions of his day. French fashions, according to Walsingham, began to be popular in England from the taking of Calais, in 1347; and since that time the ladies have had a desire to mingle French in their pronunciation. [See Chaucer's Prologue to *The Prioressse*.] The shoes in the time of Henry VII. were so long that the points were chained up to the knees. John Stowe, the grave chronicler of the times of Elizabeth, was originally a tailor, and was well qualified to describe the fashions of his day—"the golden age of millinery." It appears, from this chronicle, that starching commenced in 1564; the originator—"Mistris Dinghen Vanden Plasse"—being paid "four or five pound to teach how to starch, and twenty shillings how to seeth starch."

POPULAR GEOLOGY.

CHAPTER IV.—AGENCIES STILL AT WORK ON THE EARTH'S CRUST.

BEFORE we enter into the study of the respective strata, systems, and formations described in our last chapter, we will pause awhile to consider how far the crust of the earth is being changed or modified by existing influences. Obviously, we must do this before we can consider ourselves in a right position for the study of its ancient history. Five grand divisions occur under which all these influences may be ranged :—

- I. External, or Astronomical phenomena.
- II. Subterranean, or Igneous.
- III. Atmospheric.
- IV. Aqueous.
- V. Organic Being.

The External Influences may be reduced to the effects of light and heat.

Heat.—All the variations of corpuscular and mechanical phenomena that are everywhere ceaselessly exhibited, both in organic and inorganic substances, may be ascribed to the unequal accession of heat from the sun unto our globe, which is constantly varying in distance, and whose parts are variously presented to the calorific rays, and to the unequal abstraction of heat by the cold ethereal spaces through which our planet revolves.

Light.—In light we recognise the chief element of change in the animal and vegetable creations.

Subterranean, or Igneous Influences.—Among the subterranean influences we may first mention one special effect of the distribution of the heat that rises from the interior of the earth—that is, the gradual change of level of certain parts of the land as compared with the general level of the ocean ; as, for instance, on the shores of the Baltic, where certain parts are understood to be slowly rising above the sea. Whether this elevation is counterbalanced by corresponding depression elsewhere, is not at present known. Sir Charles Lyell thinks the sum of the depressions from this cause greater than the elevations, but no proof is given. On this important but obscure point, we shall quote the words of the author of the article "Geology," in the *Penny Cyclopædia*, who says :—"If there be in the earth a pervading high temperature, which diminishes from the interior toward the surface, it appears from Sir John Herschel's reasoning (given in Babbage's *Ninth Bridgewater Treatise*), that along the shores of the sea, the isothermal* lines of the interior of the globe should rise, because of the continual deposition of imperfectly conducting sediments there. For then the radiation of heat along these lines would be diminished until the interior heat had come nearer to the surface. By the consequent expansion of the subjacent earthy substances, the sea-shore should rise, and thus the addition of sediment from watery action, and the effect of the effort to restore equilibrium in the disposition of the interior temperature, would, upon the whole, coincide in minutely raising the surface of the sea." This comparatively regular action of subterranean heat must be carefully distinguished from the highly irregular one, to which we owe earthquakes and volcanoes.

Earthquakes form the most terrible of all natural phenomena. They make the solid globe itself tremble and quiver beneath our feet, and sometimes to appear to the eye to undulate like the waves of the sea when agitated by the wind. They break up the crust of the earth, elevating it here into hills, depressing it there into valleys ; seaming it with rents and fissures, from which often arise products never before known in the

* Curves traced on a map or globe, so that each shall pass through a series of localities, where the mean annual temperature is the same.

district; altering the course of rivers; producing new shores and beaches; raising the sea bottom up to become dry land, and depressing the richly wooded land to become henceforth the bottom of the sea; leaving cities that overhung the ocean several miles inland, and submerging other cities again below the waters; altering the distribution of animal life, and occasionally destroying it to a vast extent. Let us mention a case or two by way of illustration. In 1822, a tract of territory on the Chili coast, above one hundred miles in extent, was raised from two to six feet; and the sea bottom, thus laid bare, emitted for a long time the most intolerable odour from the decay of dead fish, &c. In 1596, on the other hand, several Japanese towns were covered by the sea.

Volcanoes and earthquakes are doubtless but manifestations of the same subterranean fires, operating with different degrees of force, and perhaps, also, under somewhat different circumstances as regard the superincumbent masses. Thus when, in 1759, the new volcano of Jorinollo was formed on the plains west of Mexico, it was what we should call an earthquake that caused the ground to swell upward like a bladder to the extent of two or three miles, and which then, bursting, became a volcano, and ejected such masses of materials that a mountain 1695 feet high was formed by them. But the effects of volcanoes in modifying the earth's crust are even yet more extensive than such events would suggest. The burning lava emitted by them has been known to issue (as from a volcano in Iceland) in such profusion, as to form a slow moving river of melted rock, fifteen miles broad, from 100 to 600 feet deep, and extending, before it finally rested, to fifty miles from the place of its issue. It is chiefly near the sea-coast that the volcanic phenomena of modern times are found; a fact which seems to show that the admission of water to the buried fires beneath, is necessary to rouse them into such a state of terrible activity.

Effects of Volcanic Action on the Bed of the Sea.—The bed of the sea is supposed to be materially affected by volcanic forces. Thus, islands are raised, as in the South Seas; which then become centres of aggregation for all sorts of matter floating in the waters, or in the air, are soon covered with vegetation, and lastly, with organic life, both of which alternately decay and spring up in never-ending sequence, and all the while increase the magnitude of the parent soil; while encroaching upon—and thereby decreasing—the size and depths of the waters around. But this kind of action may be going on invisibly to us in innumerable parts of the seas and oceans, without being sufficiently powerful to raise the lifted rocks above the surface. Of course, here again corresponding depressions take place; but whether to an equal amount is not known. Even in that case, we perceive that the general result of volcanic action beneath the seas and oceans, must be a partial deepening and contracting:—therefore still change—ceaseless change. The constancy of the earth's dimensions, as indicated by the unvarying length of the solar-day, may be supposed sufficient to determine the fact of an equality in these results; but that is by no means the case, for such changes, however important in the main, if we think of them as operating through a million or two of years, become apparently insignificant, when thought of only in connexion with our historical period.

Atmospheric Agencies include the air itself, rain, frosts, winds, and electrical phenomena; and their combined effect is to wear down, mechanically and chemically, the surface of all rocks, and to create soil; part of which is gradually strewed over the land, and becomes the means of vegetation and organic life, while the remainder is carried away by rivers and running waters towards the oceans, seas, or lakes, into which they flow.

Air acts potently upon all substances, even the hardest, that are exposed to it, through the chemical action of its oxygen and carbonic acid. Oxygen eats away the metals—carbonic acid bites into the substance of rocks—and both together, at last, reduce the surfaces upon which they act to a mere powder. As one layer, as it were, is worn away, another is ready to be attacked; and so the process goes on without cessation. Thus, iron is reduced to rust; thus, granite is pulverised to soil—

an operation which, it is said, has been effected to the depth of three inches within twice as many years.

Rain enters the fissures of rocks, softening and dissolving them, both by its chemical and its mechanical powers, and so preparing the way for the still more destructive agents that follow, as frosts, &c. It forms floods and inundations when it continues for a long time, which may sweep whole villages before it. On the other hand, it exerts a most beneficial effect in promoting the growth of vegetation. Its very floods, indeed, in certain parts of the world, produce the same effect on a large scale—as in the annual flooding of the Nile, for which the people of Egypt look always with such welcoming anticipations. The fall of rain varies greatly in amount in different parts and different seasons. Thus, in Bombay, the monthly depth of rain in June has been given as twenty-four inches, and in October as only between one and two inches. In London, the depth varies from between eight and nine inches in the half-year from January to July, to between twelve and thirteen inches in the remaining half-year. Whatever the influence exercised by rain at present, that influence was, in all probability, much greater in remote geological periods, when the heat was so much higher, and when, therefore, more liquid matter was drawn up in vapours into the sky, to descend again in rains.

Frost.—Wherever rain can insinuate itself, as already described, into the crevices of rocks, there is left an opportunity for the evolution of a highly destructive principle—the expansion of the liquid particles by freezing, and the consequent rending asunder of the rocky surfaces, which, thus enlarged, can receive still larger quantities of rain, to be again frozen and expanded, and so on, endlessly. This is one of the various modes of operation in which frost exhibits its power of modifying the earth's crust. Avalanches and icebergs show it in its grander manifestations of the same force.

Avalanches originate in the higher regions of mountains, and are formed of gradually accumulating masses of snow, which, at last, become so ponderous, that the inclined planes on which they rest can no longer support them, and they are hurled down into the valley beneath, often destroying villages, with all their inhabitants, filling up rivers so as to change their course suddenly, and scattering abroad the rocky debris which they have brought down with them.

Icebergs are immense bodies of ice, extending occasionally two miles long by one broad, and some hundreds of feet high, which are found floating in the polar seas, and are formed in two ways—in the sea itself, by the accumulation of snow and ice, or on precipitous shores, in glaciers, which are ultimately broken off by their own weight, and often carry with them enormous pieces of rock. These, as the icebergs melt, when floated into warmer regions, are dropped, with all their lesser earthy contents of gravel, &c., to the bottom of the ocean, and so help to raise its bed. The erratic masses of stone called boulders, found scattered in various parts of the world, on the surface, without any apparent connexion with the rocks in the crust beneath, are supposed to have been thus deposited in some remote time, when the locality was covered with the deep waters.

Winds raise waves—which again act upon the rocky shores—uproot forests, cover green valleys with barren sand-drift, and form extensive *Downs*—as we call those tracts of land which extend, generally at a high level, by the sea shores.

The Electrical Phenomena, which exert a sensible action on the surface of the earth's crust, are, as yet, but imperfectly studied. We are impressed by thunder-storms, for we can at once appreciate the strength of the power which sets fire to extensive forests, and shivers houses and rocks, and which not unfrequently reduces the human form in an instant to a mere blackened cinder; but it is probable that the slow, imperceptible effects of electricity are of infinitely greater importance in the production of specific geological effects. How intimately connected with all chemical and vital action that power is which we know under the various names of electricity, galvanism, and

magnetism, is a recognised truth; but we are unable, as yet, to measure its precise effects, or mode of operation. One single fact may illustrate sufficiently for present purposes the influence this power must exert in continually modifying and changing the earth's crust:—The hardest, and, to all other powers, most intractable of substances, can be artificially dissolved and reorganized by the chemist, with its aid.

Aqueous Influences.—What the atmospheric agencies thus break down, the aqueous, to a great extent, carry away; and in so doing, still further help on the grand operations of modification and change of the earth's surface.

Springs open out channels, which may ultimately become river-courses. They dissolve the rocks and minerals between, over, or around which they pass. Sometimes they exercise a petrifying power; and if heated to a high temperature, their ordinary chemical and mechanical forces are greatly increased. Unless very pure, they also carry down to the rivers into which they discharge themselves, the debris collected in their course.

Rivers perform this latter operation on a great scale—often carrying down towards their mouths such quantities of mud, sand, gravel, &c., as to form vast plains, called deltas, like those of the Ganges and the Nile. But rivers are destroyers as well as carriers. We refer to the process known in geology as—

Denudation—a word meaning to lay bare, and devoted to the expression of the effects of running water in the removal of solid matters on the surface, and thus of laying bare some rock beneath, which is then said to be denuded. The power of rivers in this way has been reduced to the following calculation:—If the speed be three inches per second, fine clay will be torn up; if six inches per second, fine gravel will be raised; if twenty-four inches, rounded pebbles an inch in diameter will yield to the momentum, whilst a speed of thirty-six inches in the second is sufficient to drive along angular stones as large as a hen's egg. The effect of such forces, when operating through a long period, is almost incredible. There are gorges in the valley of the Alps 600 to 700 feet deep, which have been thus scooped out. The great cataract of Niagara has receded, under the operation of this power, fifty yards in less than as many years of the present century. These facts show the ordinary action of rivers; but when swollen so as to overflow their banks, a new class of effects are produced on the surrounding land, and which are often of a very serious character.

Effects of River Sediments on the Sea-bottoms.—The sediments thus formed by all the foregoing influences, and borne along by springs and rivers, are deposited by the sea shores, and are therefore steadily diminishing the depths of the sea. Now, as the quantity of water on the globe is supposed to be constant, this change in the sea must be accompanied by an increase of the whole watery or oceanic area, or the surface must rise. The former is probably the truth. As much land is probably worn down in one part by the action of the waves, as is wasted in another by the deposition of sediments. For such waves, by their restless agitation, undermine the cliffs that are above their level, grind away the rocks that are covered and uncovered during every ebb and flow of the tide, and form out of the materials at its disposal, here a dangerous sandbank—there a cultivatable piece of land, out of what was merely the sea-shore.

Organic influences are, perhaps, the least important of all those we have named, in their effects upon the crust of the globe. They are not, however, to be passed over in silence. Their effects may be summed up generally thus:—They increase the superficial soil—or that which, at some time or other, has been the superficial soil,—by their decay after death, and the fresh luxuriance of organic life to which the decay gives rise, by the increase of its food; such organic life again decaying—and so on perpetually.

Plants living in the sea do not probably materially affect the crust, except by their support of animal life; which, as we shall presently observe, has a noticeable effect on the sea-bottom. But terrestrial plants play a more conspicuous part: witness the formation of great bogs, which we often find (as in Ireland) to cover a very extensive space, and to

sink to a considerable depth—the coal measures a thousand yards deep—and the accumulation of trees and other vegetable matters, which are carried down towards the sea in such vast quantities through the greater rivers of the world; as, for instance, in the Mississippi, where what are called rafts, formed of tangled trees, roots and brush-wood, are found several feet thick, and several miles in length. The snags, that is, trunks of great trees, buried in the bed of the same rivers, and which frequently project so high as to endanger steam-boats, also suggest how great an influence vegetable remains may exercise, under certain circumstances, in changing or modifying the superficial configuration of particular localities.

Plants have at the same time, be it observed, a great conservative tendency. Their matted roots bind together the loose sand of sea-shores, and generally everywhere protect the soil from the power which wind and heavy rains, or inundations, would otherwise exercise over it.

Animals.—We have already had occasion incidentally to notice the wonderful agency of animal life in building up large portions of the actual surface of the earth. We may still further illustrate this point by a few words upon that most interesting of animalculæ, the coral, whose structures have been a never ceasing theme of admiration with the poet and naturalist. The animal itself is scarcely so big as a pin's head, is of a soft gelatinous structure, and star-shaped; and in order to form a single branch of coral, millions of them must unite their tiny bodies together. Yet this small, almost invisible creature, through its power of secreting lime from the water, will raise solid structures in the sea capable of resisting the wildest attack of the waves, and which shall extend to immense distances. There are groups of coral reefs in the Pacific extending from 1,100 to 1,200 miles in length, and from 350 to 400 in breadth. Sometimes the reefs appear as islets; sometimes as circular belts, enclosing a sort of lagoon, or lake within; but generally in long ridges, averaging in width from 20 to 100 feet thick. The circumstances under which these tiny architects labour, make the results the more wonderful. "No periods of repose are granted," says Mr. Darwin, an intelligent observer, "and the long swell caused by the steady action of the trade-wind never ceases. The breakers exceed in violence those of our temperate regions; and it is impossible to behold them without feeling a conviction that rocks of granite or quartz would ultimately yield and be demolished by such irresistible forces. Yet these low insignificant coral islets stand, and are victorious; for here another power, an antagonist to the former, takes part in the contest. The organic forces separate the atoms of carbonate of lime one by one from the foaming breakers, and unite them into a symmetrical structure; myriads of architects are at work day and night, month after month, and we see their soft and gelatinous bodies, through the agency of the vital laws, conquering the great mechanical power of the waves of the ocean, which neither the art of man, nor the inanimate works of nature, could successfully resist." The coral rocks are not, of course, raised directly from the ocean's bottom, but on the summits of hills, and probably of volcanic peaks, both of which are, perhaps, far more numerous at the bottom of the ocean than on the land. Thomas Montgomery, the author of the *Pelican Island*, gives us the following fine passage descriptive of the labours of the coral animalculæ :—

"Millions of millions thus, from age to age,
With simplest skill, and toil unweariable,
No moment and no movement unimproved,
Laid line on line, on terrace terrace spread,
To swell the heightening, brightening, gradual mound
By marvellous structure climbing towards the day.
Each wrought alone, yet all together wrought:
Unconscious, not unworthy instruments
By which a hand invisible was rearing
A new creation in the secret deep.
Omnipotence wrought in them, with them, by them;
Thence what Omnipotence alone could do
Worms did. I saw the living pile ascend,
The mausoleum of its architects—

Still dying upwards as their labours closed :
 Slime the material, but the slime was turn'd
 To adamant by their petrific touch.
 Frail were their frames, ephemeral their lives
 Their masonry imperishable."

On examining a piece of coral, its surface is perceived full of little openings, each of which contains one animal: the whole coral pile therefore is as a vast house for the family, in which house each individual has its own apartment. Shell-fish, on the contrary, which possess the same power of secreting lime, use it to form a separate shell for each individual, and which has no connexion with that of any other individual, except that of mere contiguity. Oysters, mussels, and cockles are thus separate, even while forming together beds of many miles in extent. After what we have seen of the power of the coral animalculæ to affect the earth's surface in the ocean-depths, we need not be surprised at the statement that these, and the other tenants of the waters belonging to such tribes as the zoophyta, testacea, &c., flourish in such amazing profusion, that their very exuvizæ tend markedly to fill up the almost boundless depths where they inhabit.

Care necessary in judging of the ancient from the modern effects of the foregoing influences.—Although we everywhere recognise through all nature fixed laws, we also as universally behold varying conditions under which they act. It is not, therefore, to be assumed that what changes we now see going on in modern times, are in themselves a sufficient measure of comparison to estimate the force of the laws causing these changes in remoter ones. Light and heat, for instance, are phenomena exhibiting certain regularities of action called laws: we see the results of their action now; we know the source of light and heat was the same in all past time; and we may, therefore, naturally conclude, that their effects were very much the same then as they now are. But, as it has been well pointed out, let the sun's rays be but supposed to fall upon the earth in smaller quantity, through the augmentation of the minor axis of the earth's elliptic orbit; let the temperature of the ethereal spaces rise; who does not see that all the effects depending on the external excitant forces would immediately change? Now this very orbit is variable.

Also to allow for possible causes, of great moment in their results, but of which no traces remain.—Again, what physical changes may not be wrought by a cause of so trivial a character, that, while its effects might modify the entire future of the globe, it should leave not a trace of itself behind! Suppose, for instance, an earthquake were to sink the Isthmus of Darien but a hundred or two feet below its present level, who can estimate the effects upon the Indian, Mediterranean, Atlantic, and Pacific oceans over areas of enormous extent, and affecting the stratified deposits, and physical conditions, and consequent variations, in the relative abundance and geographical distribution of organic life? These and similar facts show how humbly the geologist should pursue his researches—yet how earnestly and unremittingly—if he would base his noble and beautiful science on solid foundations.

Nature's efforts for an Equilibrium.—And, independent of the various truths involved in the phenomena we have glanced at in the preceding pages, what—it may be asked—is the higher meaning of the whole?—the objects sought by all this incessant change and conflict? We may answer, in the eloquent words of the Cyclopædist writer already referred to:—"The never-ceasing activity of the powers of nature, is an inextinguishable, though an unavailing effort to restore an equilibrium which is incessantly disturbed. The Protean changes of the atmosphere; the varying effects which its chemical and mechanical energies occasion among the masses of dead matter and the forms of life; the flowing of the ocean; the subterranean fire, and wide wasting of the earthquake, are all efforts to obtain rest, consequent on a succession of perturbations. In this sense, not the earth only, but all the solar system—and, perhaps, all the extent of the heavenly spaces—conceivable rather than visible by man—is in the condition of instability described in the Pythagorean philosophy, *Nihil est toto quod perstet in orbe.*"

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

3. *Special Course of Study to be pursued by the Medical Student.*

IN my two former letters you possess a general sketch of the mental training necessary to prepare you for studying with advantage those subjects which are justly regarded as the elements of medical science. We will suppose you standing thus prepared, on the threshold of the temple of Æsculapius, and eager to commence your career as a medical student, in earnest. That career I shall divide into three epochs, more for the sake of pointing out the sequence in which these elementary sciences ought to be studied, than with the hope that you will be able to follow strictly the course indicated. I would advise you, notwithstanding, to adhere to it as closely as your opportunities will admit of.

During the *first* epoch, your chief aim should be to make yourself accurately and intimately acquainted with the whole animal economy of man in a state of health; with the construction and organization of the human body, the purposes executed by each organ separately, and the general result of their combined action. Who that is ignorant of the natural structure of the body—in other words, of its mechanism—and of the manner in which its various functions are carried on in health, can form any clear and distinct notions of disease—which is either altered structure, or disordered function? Would you hazard your watch, for regulation or repair, in the hands of a man who knew nothing of its complicated works and movements? And yet the mischief done by the rash meddling of a bungler is, in this case, remediable; whereas the unqualified pretender to medical skill, working in the dark among the “silver cords” and delicate machinery of our infinitely more complex fabric—that “cunning’st pattern of excelling nature”—may not merely fail to cure his patient, but often inflicts an injury, unconsciously, which no human hand can repair. *Anatomy* and *Physiology* are the only sure groundwork both of medicine and surgery. But to enable you to

penetrate their arcana thoroughly, a knowledge of *Chemistry* is indispensable. To these three objects, therefore, a medical student’s earliest attention ought, if possible, to be directed.

The *second* period should be devoted to the investigation and comparison (for the sake of distinction) of those almost infinite shades of deviation from the healthy condition of the frame which constitute disease. *Anatomy* and *Physiology* thus conduct us to *Morbid Anatomy* and *Pathology*, or the doctrine of diseases; a vast and varied field of inquiry, which will task the energies of your mind to the utmost. And, when some advance has been made in these important branches of our subject, the time has at length arrived, when you will be able to comprehend the first principles of the art of healing, and may profitably enter upon the study of *Therapeutics*, or that department of medicine which treats of the operation of the different means employed for curing diseases, and of the judicious application of those means. Bear in mind, however, at this juncture, the precept of the old Greek philosopher, who enjoined a long probation of silence and meditation before his disciples were permitted to speak; and presume not to act until you have gone through more than one course of lectures on the principles and practice of medicine and surgery—have listened attentively to the *Clinical Professor*, at the bed-side of the patient; watched heedfully, under his guidance, the various symptoms, in their several degrees of importance, as they arise, and the successive stages through which the disease passes; and noted, finally, the effects of the remedies applied, the peculiar conditions in which, and the objects for which they were administered.

And this brings me to the *third* epoch—that which is, in fact, the end and complement of the other two, the unaided application, namely, of the knowledge you will hitherto have been storing up; the reduction of theory to actual *Practice* on your own responsibility; a period not limited to student life. Our science is ever on the advance; experimental research is adding something new to it daily, and the conscientious medical man, acting in the spirit of the motto on Goethe’s ring:—“*Ohne Hast, doch ohne Rast*”—Haste not, rest not,

—learns to regard his whole life as a state of pupilage, in the school of Nature. "*Ars longa, vita brevis, experientia fallax*"—is the oracular commencement of the first Aphorism of the father of Physic; and I believe it to be the one the truth of which is most profoundly felt by his children. At any rate, it may fairly lay claim to the distinction of being the one most frequently quoted.

The above is a brief outline (which my next and final epistle shall fill up in detail) of the order in which it would be well to pursue your studies, were it in your power to shape your course independently of circumstances; if, in short, you were a denizen of the metropolis, and the portal of one of its fanes of Æsculapius stood invitingly open before you. But your connexions reside in the country, and mothers instinctively shrink from exposing the cherished one, prematurely, to the tainted atmosphere proverbially enshrouding "huge cities that boil over with their scum." You have, moreover, to encounter prejudices in favour of a style of medical education somewhat *à l'antique*; the prestige of which may have been shaken, but is not yet entirely done away. It is in contemplation, you inform me, to place you as a pupil with Mr. B., the medical attendant and long-tried friend of your family. According to old-established usage, ninety-nine out of the hundred of the general practitioners of England were initiated into what was formerly designated as the art and mystery of the apothecary, by a five years' apprenticeship to Pharmacy. A deplorable misapplication this, of the most precious years of a man's life—the seed-time, on the profitable employment of which the future harvest mainly depends. Fortunately, it is a custom now "more honoured in the breach than the observance." Yet let me not be misunderstood; a practical acquaintance with Pharmacy is of the utmost consequence to the medical practitioner, whatever be his class or grade. I merely protest against the absolute waste of so much valuable time, in learning what may be fully mastered by systematic and steady application in six or eight months. Mr. B. is, however, a very intelligent and well-informed man, and an experienced surgeon. He has seen much of the world, and his views are enlarged and liberal. The

modification, therefore, which I venture to suggest, of the plan proposed by your friends, is, that you should not be articleed to him for more than two years. Adroitness in pharmaceutical manipulation and dispensing will soon be attained, and you may employ your spare time in making yourself thoroughly familiar with the characters and properties of the simpler articles of the *Materia Medica*, and with the composition of the more complex. But you need not confine your labours to a field so narrow as this. Mr. B. possesses a well-selected library, and the rudiments of both Chemistry and Physiology are thus within your reach. Much, also, of Anatomy may be learnt from books, especially if you exercise your pencil in copying from such plates as those of Cloquet, Bourguery, or Maclise, the various parts of which you read the description. As a relaxation from more sedentary and stationary occupations, you can have no more attractive pursuit than *Botany*.

Had any less eligible connexion than that with Mr. B. presented itself, I should strongly have urged your attaching yourself for a couple of years to the neighbouring county hospital. Anatomical demonstrations are occasionally given to its pupils, and considerable insight into anatomy, healthy and morbid, may be obtained by assisting at examinations after death. At the same time, the habits of observation formed in your preliminary studies, would have been brought to bear upon disease, as you accompanied the physicians and surgeons through its wards.

In my next, we will, in imagination, "walk the hospitals" of London together, when I will trace out for you what I conceive to be the most direct and effective mode of qualifying an ardent and earnest medical student, not alone for passing examinations with *éclat*, but for discharging the responsible duties of his profession with ability and integrity. You shall then, likewise, be furnished with a catalogue of the best works upon each department of medical science.

Much adversity is requisite to make us hate life; a beckon from prosperity will recal this hatred instantly.

NEW SCHOOL EXERCISE.

WE find the following in a recent American publication :—

“We are much pleased with a novel school exercise which has been tried in one of our public schools with great success, and has proved both interesting and profitable to the pupils. For the benefit of instructors, we give the plan adopted, assuring them that a trial will convince them of its interest and utility.

“To each pupil in the most advanced class in school let a country be assigned : to one, we will suppose, England ; to another, Germany ; to another, Russia. Let all the most important countries be assigned, and if the class is not large enough, let a pupil have two or three countries as his portion. Then request each of the pupils who has received an assignment, to prepare a digest of every matter of interest which occurs in his or her country, the said digest to be presented before the school at some time which may be selected.

“We will suppose there is a class of twenty pupils. To each pupil is assigned some division of the world, of which he is to give all the news that may come to hand. Suppose every other Saturday an hour be spent in the exercise. The whole school may be allowed to participate. The pupil to whom is assigned England is called on to report. He gives perhaps an account of the closing of the Crystal Palace ; the reception of Kossuth, or some other matter of interest, which can easily be gleaned from the newspapers. And so let the whole globe be traversed.

“We are certain that the exercise will prove advantageous. It will give scholars information which will be of great benefit to them. There is nothing so important at present as to keep the young well informed on the current events of the day. The facilities for receiving information are now so great, that there will be no difficulty in obtaining sufficient materials. Instead of stories and anecdotes, they will seek those departments of intelligence which are highly important, but too often neglected.

“The same plan might easily be extended with profit. Let similar divisions be made with regard to the sciences. Assign to one

pupil astronomy ; another, geology ; and another, the mechanical arts ; and let occasionally an hour be spent in hearing reports as to advancements which have been effected—the new inventions which have been made. We can assure teachers, that they will be surprised to witness the alacrity and interest with which the pupils will study subjects generally considered dull and prosaic.”

AN ENIGMA.

I AM a word of seven letters. My very aspect is enough to freeze you, yet I continually carry boiling water in my bosom. Surrounded by the strongest barriers the hardest winters can forge, the heat within me is so intense, that I am like a man who is perpetually torn by the most unruly passions ; they heave and swell and toss him to and fro until, no longer able to bear constraint, they find vent in some dreadful catastrophe, that shakes to its very foundations the social circle of which he forms a part. So my ever burning entrails are in a state of continual ebullition : the pent-up vapours seek for a release, and ever and anon shake with terrific violence the solid earth of my sea-girt dwelling, while I eject from my fiery mouth showers of burning stones, that are afterwards found strewn over the surface of my body. Such is my fame, that during the summer, when night is almost swallowed up by day, I am visited by the curious, who regard me with wonder and admiration, and strip from my ever boiling bosom the brimstone with which it is encrusted ; yet in the dark, dreary, and lonesome winter I am left to listen to my own bellowings, and gaze on a sky now and then illuminated by the reflection of the fires that are ever burning within, but not consuming me. Reader, it is for thee to unravel this entity of contrarieties — of fire and water, of heat and cold ; of the eternal repose of winter, and an activity far greater than that exhibited by the intense heat of the tropics—and it may be to visit me in my abode of loneliness ; and when thou comest, remember thou wilt not find me in the usual track of nations, but thou must seek a special conveyance to bring thee to look upon my wonders.

THE PHÆNOMENA OF THE ATMOSPHERE,

ILLUSTRATED BY THE METEOROLOGY OF
GREENWICH.

[For the purpose of elucidating the subject of Meteorology, the author of the following paper has carefully discussed the entire series of observations made at the Greenwich Observatory during seven years, and thrown the whole of the results, together with his deductions from the Kew Observations of Electricity, into the form of an article on the Meteorology of Greenwich. It is believed to be the only paper yet published that embraces the mean values of all the meteorological elements known, from so large a number of observations; and it is written in such a form as to exhibit the dependence of all the other elements on temperature, and this on the annual and diurnal motions of the earth. This mode of treating the subject is presumed to be as novel as it must be valuable.—*Editor.*]

THE thin ærial shell encompassing our globe presents a variety of phænomena, alike interesting to the agriculturist, the manufacturer, the artisan, and the navigator; and although the present state of our knowledge will not allow us, with *certainly*, to predict the recurrence of these phænomena, yet the researches of the last ten years have so elucidated their laws, that we are able to place their variations, which are dependent on the position of the sun, either with regard

to the diurnal rotation or annual revolution of the earth, in such a light, that a beautiful harmony between their different relations, and the evident mutual dependence of these relations on temperature, are apparent. It may therefore not be out of place, in a work of this kind, which has peculiar reference to the exhibition of phænomena under such an aspect as to render them a portion of our general and every-day knowledge, to place before the reader those movements of our atmosphere which, were it not for disturbing influences of a rather complicated character, would daily and hourly be matter of observation and prediction.

It is well known that the atmosphere consists of a permanently elastic fluid, which expands by heat and contracts with cold. Mixed with this fluid in all conditions of the atmosphere, is a quantity of water in an æriform or invisible state, known meteorologically as *aqueous vapour*; the permanently elastic fluid being termed *dry air*. This mixture is heated by the sun warming the earth immediately below it; and we have a beautiful diurnal law of this heating revealed to us by a thermometer, placed four feet above the surface of the earth. The result of about 26,110 observations at the Royal Observatory, Greenwich, is given in the following table:—

TABLE I.
MEAN DIURNAL VARIATIONS OF TEMPERATURE.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
45°·4	44°·8	44°·8	46°·9	50°·4	53°·6	55°·1	54°·5	52°·3	49°·5	47°·5	46°·3

While this mixture is undergoing changes of capacity by heat, the water is also varying in quantity. A cubic foot is a convenient measure of space by which to estimate its variations; and a thermometer having its bulb moistened, a suitable instrument for

determining their value. From about 22,400 observations at Greenwich with such an instrument, the diurnal variation of the amount of water in the space of a cubic foot of the atmosphere, estimated in grains troy, is as follows:—

TABLE II.
MEAN DIURNAL VARIATION OF THE WEIGHT OF WATER IN A CUBIC FOOT OF ATMOSPHERE.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
GR.	GR.	GR.	GR.	GR.	GR.	GR.	GR.	GR.	GR.	GR.	GR.
3·52	3·49	3·51	3·64	3·78	3·88	3·92	3·89	3·79	3·71	3·63	3·58

It will be readily seen from a comparison of the two tables, that as the temperature

increases the amount of water also increase from three grains and a half to nearly four

grains. This arises from the greater facility with which water rises into, and is held by the atmosphere, as it becomes warmer. The quantity of water is small, but a better conception of it may be obtained by regarding the mean quantity, as deduced from the foregoing number of observations, existing in 1000 cubic feet; *i.e.* a space 10 feet by 10, and 10 feet high. This quantity is a little more than half a pound, or about four-

tenths of a pint; so that, on an average of six years' observations, there is such a quantity of water in 1000 cubic feet of atmosphere, that, were it *all condensed*, it would yield about two-fifths of a pint.

This, however, is not the entire quantity of water that can be contained in 1000 cubic feet of atmosphere. At the mean temperature, as deduced from all the observations, this space is capable of holding

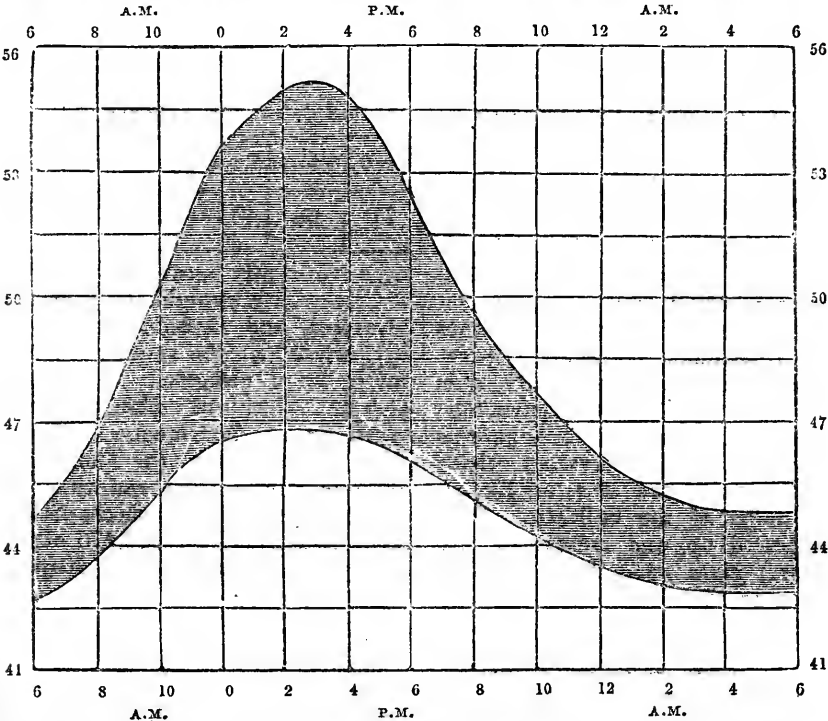
TABLE III.
MEAN DIURNAL VARIATION OF THE DEW POINT.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
43°·1	42°·9	42°·9	44°·0	45°·2	46°·2	46°·5	46°·3	45°·6	44°·7	44°·1	43°·6

half a pint, or five-tenths. From this we learn, that either the tenth of a pint must be added, or the air must be cooled down to a *point* at which any excess of water will

be deposited as *dew* before condensation can take place. Table III. exhibits the diurnal variation of this lower temperature—the *dew point*, as it is termed—meteorologically.

Curves of the mean diurnal variations of the Temperatures of the air and dew point, showing the greater amount of refrigeration during the day necessary to precipitate dew.



The above diagram will make this very intelligible to the eye. The upper curve represents the mean diurnal temperature, and the lower the dew point. From the greater difference between them while the sun is above the horizon, and during

the middle of the day, we see the reason of the *dryness* of the day as compared with the *moisture* of the night.

The degree of humidity is very easily expressed. If the weight of the existing water be divided by the weight necessary to saturate the air, it will be seen that, regarding the point of saturation as unity, the

nearer the existing weight is to the saturating weight, the nearer the quotient will be to unity. The following table exhibits a decrease in the degree of humidity as the temperature increases; in other words, the dryness increases as the day advances, and decreases as the evening approaches.

TABLE IV.

MEAN DIURNAL VARIATION OF THE HUMIDITY OF THE AIR.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
0.926	0.934	0.938	0.906	0.843	0.783	0.753	0.761	0.800	0.851	0.891	0.914

Whenever the quantity of water is greater than the atmosphere can contain at any existing temperature, condensation takes place; and also, if the conditions necessary to produce it are present, precipitation. If this condensation or precipitation occur in the lower regions of the atmosphere, either fog or dew results; thus, we often find, after a fine clear day, a thin white mist creeping along the valleys; or during a serene and cloudless night, a copious

dew deposited. On the other hand, if the vapour rise high in the atmosphere, it at last meets a stratum of air sufficiently cool for condensation, and cloud is formed. By a very careful series of observations at Greenwich, the cloudiness of the atmosphere is found in harmony with the temperature. The following table exhibits its diurnal progression, a sky completely covered with clouds being represented by 100.

TABLE V.

MEAN DIURNAL VARIATION OF THE CLOUDINESS OF THE ATMOSPHERE.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
65	67	69	70	71	71	71	69	66	62	60	61

The connexion between this progression and the temperature evidently depends on the greater amount of water passing from the earth into the atmosphere during the day.

In the act of condensation, electricity is developed. The value of the electric tension has been determined by an apparatus employed at the Kew Observatory, which consists of a copper rod elevated 16 feet above the dome of the building. This rod is supported by, and connected *only* with a strong glass cone, having within it a copper cone that is heated by a lamp

kept constantly burning. By this means, the electricity brought down by the rod is insulated, and therefore retained in the apparatus. At the summit of the rod, a small lamp, protected by a lanthorn, is also kept burning. The tension is measured by an instrument called Volta's Electrometer, and the following table exhibits the diurnal variation of atmospheric electricity in divisions of this instrument, as deduced from 10,176 observations during three years at the Royal Observatory, Kew:—

TABLE VI.

MEAN DIURNAL VARIATION OF ATMOSPHERIC ELECTRICITY.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
20.1	20.5	34.2	68.2	88.1	75.4	71.5	69.1	84.8	102.4	104.0	22.6

It will be immediately seen, on comparing this table with the foregoing, that the variations of atmospheric electricity differ very materially from those of the temperature and humidity. Instead of *one* maximum and *one* minimum during the twenty-four hours, there are two; and it is not easy, in the present state of our knowledge of the subject, to connect the diurnal

variations of the electricity with either the temperature or humidity; a double progression generally indicates the joint action of at least two agencies. This, however, is not the case with the annual variations. The following table shows, that the variations during the year are greatly in harmony with those of the humidity.

TABLE VII.

MEAN ANNUAL VARIATION OF ELECTRICAL TENSION AND HUMIDITY.

Period...	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Electric.	151	167	75	57	38	29	39	29	33	51	70	109
Humid.	908	894	856	821	829	791	816	845	874	893	911	910

Not only does the temperature influence the humidity, and through this element the electricity; but it renders the mixed atmosphere lighter, and, consequently, produces from all parts of the surface of our globe an ascending current of air. The diurnal variation of the weight of the air is, as

may be expected, of a similar character to the variations of humidity, decreasing with increasing temperatures, as exhibited in the following table, in which the weights are expressed in grains troy, the space being a cubic foot.

TABLE VIII.

MEAN DIURNAL VARIATION OF THE WEIGHT OF A CUBIC FOOT OF AIR.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 N.T.
GR. 541.7	GR. 542.2	GR. 542.2	GR. 540.1	GR. 536.3	GR. 532.9	GR. 531.0	GR. 531.5	GR. 533.9	GR. 537.2	GR. 539.4	GR. 540.6

This regular diminution in the weight of the air, from $542\frac{1}{4}$ grains to 531 grains, as the temperature increases, is manifested by the increasing force of the wind, which results from the colder air flowing in to supply the place of the warm air (which is continually ascending), with

a varying velocity proportioned to the velocity of the ascending current. The following table, deduced from six years' registers of Osler's Anemometer at the Observatory, Greenwich, exhibits the sums of the pressure of the wind upon a square foot in lbs. avoird. at each hour of the twenty-four.

TABLE IX.

DIURNAL VARIATION OF THE PRESSURE OF THE WIND.

1 A.M.	2 A.M.	3 A.M.	4 A.M.	5 A.M.	6 A.M.	7 A.M.	8 A.M.	9 A.M.	10 A.M.	11 A.M.	Noon
603 $\frac{1}{2}$	584 $\frac{1}{4}$	546	558 $\frac{1}{2}$	575	585 $\frac{3}{4}$	650 $\frac{3}{4}$	781	906 $\frac{3}{4}$	1,008 $\frac{3}{4}$	1,204 $\frac{1}{2}$	1,360

1 P.M.	2 P.M.	3 P.M.	4 P.M.	5 P.M.	6 P.M.	7 P.M.	8 P.M.	9 P.M.	10 P.M.	11 P.M.	12 N.T.
1,405 $\frac{1}{4}$	1,415 $\frac{1}{4}$	1,323 $\frac{1}{4}$	1,187	1,032 $\frac{1}{2}$	874	721	694 $\frac{1}{4}$	649 $\frac{3}{4}$	634	650 $\frac{1}{2}$	642 $\frac{1}{4}$

It might be expected that, as the atmosphere is rendered lighter by the effect of

temperature, not only would the increasing force of the wind manifest this result, but

the well-known instrument, the barometer, would also indicate it by falling during the day, thus showing a diminished pressure of the atmosphere. The diurnal variations of the barometer are, however, rather complicated; there are two maxima and two minima in the course of twenty-four hours, agreeing in this respect with the variations of electricity. The following table exhibits

the mean barometric diurnal period, from six years' observations at Greenwich, expressed in inches and parts, being the average height of a column of mercury, which the pressure of the atmosphere is capable of supporting at each of the hours named. It is to be read thus: at 2 P.M. the pressure is 29 inches and 774 thousandths.

TABLE X.

MEAN DIURNAL VARIATION OF ATMOSPHERIC PRESSURE.

2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
29·773	·765	·766	·776	·786	·785	·774	·767	·768	·777	·784	·784

It is well known that the elastic force of atmospheric air is equal to its pressure, and also, that while the aqueous vapour exists in an æriform and invisible state in the atmosphere, it undergoes changes in its elasticity proportional to its temperature. The result of these relations is, that while the dry air has its elasticity or pressure *reduced* by expansion during increasing temperatures, the aqueous vapour has its elasticity *augmented* during the same period

of the day, consequently, the effect of each element on the barometer is of an opposite character. The following table places this in a clear light, so far as the presence of the sun above the horizon is concerned, and at the same time shows, that the barometric pressure is made up of the separate pressures of dry air and aqueous vapour, the sum of the two pressures in Table XI. being equal to the pressure in Table X.

TABLE XI.

MEAN DIURNAL VARIATION OF THE PRESSURE OF DRY AIR AND AQUEOUS VAPOUR.

Epoch . .	2 A.M.	4 A.M.	6 A.M.	8 A.M.	10 A.M.	Noon.	2 P.M.	4 P.M.	6 P.M.	8 P.M.	10 P.M.	12 NT.
Dry Air .	29·463	·462	·462	·459	·455	·443	·429	·424	·434	·453	·467	·473
Vapour . .	0·310	·303	·304	·317	·331	·342	·345	·343	·334	·324	·317	·311

To each of the numbers on the upper line 29 is to be prefixed, and to each of those on the lower, 0; thus at 2 P.M. the pressure of dry air is 29 inches 429 thousandths, the elastic force of the vapour at the same hour being 345 thousandths of an inch.

It will be observed that the mean variation of the vapour pressure perfectly agrees in every respect with all the other phenomena of humidity, having its turning points identical, or nearly so, with those of the temperature. The pressure of dry air during the day agrees with the temperature, but in an inverse order; there is, however, some difference in this respect between the pressures of dry air and aqueous vapour

during the night. The greatest pressure of dry air occurs at 12 at night, and both dry air and vapour are decreasing in pressure during the early morning hours. Upon projecting the pressures of dry air in a curve, and from the summit of each ordinate, or the extremity of each vertical line representing the pressure, measuring off the value of the elastic force of vapour, the curve of the variations of the barometer will be produced, when it will be seen that the depression of the barometer, from four to six in the morning, results from the decrease in the elastic force of the vapour; while the depression, about four o'clock in the afternoon, is the effect of the diminution

of the pressure of the dry atmosphere at that period of the day.

All the above enumerated phenomena are beautifully in harmony with the diurnal march of temperature. This is the main-spring of all meteorological affections. The sun, as he rises above the horizon, warms the surface of the earth, which in its turn communicates its heat to the air above it. The air thus heated is able to contain, in an invisible state, more water, which accordingly rises from the earth into the atmosphere; but as the heating process is in advance of the evaporating, there is upon the average less water present than the air can contain; the difference in this respect increasing with the temperature, an increasing degree of dryness as the day advances is the result of these relations. The ever varying scenery of our skies, presenting to our notice the mountainous and rugged cloud, the soft and woolly dappled streaks stretching oftentimes from one point of the horizon to the opposite, and the thread-like filaments that frequently tinge with purest white the deep azure of our autumnal heavens, is an effect entirely produced by changes of temperature; also the electrical changes, usually silent, but occasionally terrifying by the far gleaming flash of lightning and the reverberating peal of thunder, owe their existence to alternations of temperature. Another result of the increasing temperature is the diminution of the weight of the atmosphere, and this is accompanied by a flowing in of the air to feed, during the day, a constantly ascending current, the force of the wind at two in the afternoon being about two-and-a-half times its force at three in the morning. By carefully studying the effect of temperature on each of the meteorological elements of the atmosphere, we find the complicated phenomena of pressure also in beautiful dependence on it. Thus all the arrangements for our existence in the present state may be traced to the twofold motion of the earth, which gives rise to two well-marked progressions of temperature—a beautiful instance of the results of the ordinances of Heaven, which “commandeth the morning,” and “causeth the day-spring to know his place;” and also “bringeth forth Mazzaroth in his season,” and “guideth Arcturus with his sons.”

IDEAL OF A MARINE PALACE.

I SHOULD like a marine palace to look as if it had been founded by Neptune and adorned by the sea nymphs. Let us consider. The sea gives us the idea of vastness, boldness—the coast (I take some part of our own) of severity, ruggedness; the sea and coast viewed together, impress us with the notion of grandeur. We will not, then, think of building what we call a pretty palace, nor of florid style, nor of frittered ornament. We will have a style in accordance with the ideas we have gathered from the place. We want a grand disposition of masses, severity, solidity. We are going to build in the very face of the ocean—our base naturally buffeted with the waves, our summit by the hurricane. Now, I say, if we observe all these things, imbuing our minds with the spirit of the place we are going to build in, we carry out in our main design the poetry of architecture. As to the ornament, it should be vocal of the sea. If ever dolphins and shells are justifiable, they are so here; they belong to the place. Those only who have studied it, can imagine what an infinity of beautiful things there is in the deep—what graceful foliage, what lovely coralline trees. * * The plants of the sea (for instance, that commonly known as *maiden's hair*), are of the finest and most delicate sort; its smaller inhabitants and their shells, of every variety of form. Surely, then, in the marine palace, we shall not be compelled to have no foliage but such as grows on the land; no ornament but such as the forms of the country suggest. * * We are going to build before Neptune, and are bound to consult him. Our palace is to stand between the sea and the earth, and it should equally declare the wonders of both. If this be done, we carry thoroughly out that kind of expression which is achieved, even in words only, by the poet; we realise the poetry of architecture; we erect a palace that does belong to the ocean: that is, marine in another and truer sense, than that of being merely taken up, like Aladdin's, by some ghoul of prejudice from somewhere far in the interior, far from the sea, and clumsily dropped upon the coast.—*From an admirable paper in the Builder, entitled "Architecture and her Offices."*

THE BIRD TALISMAN.

AN EASTERN TALE.

FOR THE TUTOR'S YOUNGER PUPILS.

(Continued from page 92.)

THE late queen had taught the little princess to work, and she soon made herself a very neat suit of clothes, such as poor people's children wear; for the old fisherman and the parrot thought she would be safer in that disguise. They also told her to keep in doors, for fear of being seen and known by anybody. There was, however, a little garden at the back of the fisherman's cottage, in which she was allowed to go; and she managed to pass her time pleasantly enough between doing the work of the house, mending the nets—which the fisherman taught her to do—and playing with her birds. Every day the old man went a fishing, and, with the money he got by selling his fish, he bought whatever was necessary for the little household, and everything prospered with them for a time. But the season for catching the best

fish was nearly over, and by and by he was less successful in his fishery, and at last he had great difficulty in getting enough to eat. The fruit season was over, too, so that the daws were unable to find any fruit for their mistress, and the household began to be reduced to great distress. One day, the old man came home from fishing without having caught a single fish, and he was just sitting down with the little girl, to dine on a little bit of mouldy bread, which was all he had left in the house, when the two daws flew in at the window, with each of them a piece of gold money in their bills, which they laid on the table, and then told the princess how they had got it. They said that they had been flying all about the palace garden, to see if they could find any fruit left, and had perched to rest themselves on the top of an old chimney. They peeped down the funnel, which was very wide and short, and saw something glittering at the bottom, and one of them flew down, and found himself in the royal treasury, with quantities of jewels and money scattered all about. He called to the other to come down, and they each



picked up a piece of gold, and flew up the chimney with them, and so home. The old man was delighted at the sight of the gold, and said he considered it the princess's own money, for the king, if he knew it, would be glad to give her a thousand times as much if she wanted it; so he immediately went out, and bought provisions, and whatever else was wanted. While the money lasted, they all lived as comfortably

as possible; and when it was all spent, the daws went and got some more. One day, the little princess was playing by herself in the garden, and looking up, she saw a gipsy woman looking at her over the low wall of the garden. As soon as the woman saw that she was observed by the princess, she began to bow down her head, and kiss her hand to her very humbly, and said—"Oh, my sweet young lady!—give me a

morsel of food, for I am starving to death." The princess ran to the house, and fetched her a piece of bread, and handed it to her over the wall, when the gipsey suddenly threw a cloak over the little girl's head, and wrapping it round her face, so that she could neither see nor cry out, she caught her by the arm, and pulled her over the wall. Then, folding the cloak close round her, she threw her like a bundle over her back, and ran off with her, threatening to cut her throat if she made any noise. She was carried in this manner a long way, and felt almost stifled by the cloak. When at last she was set down, and the cloak unwrapped from round her, she found herself in a wood, surrounded by a large family of gipseys, who had a fire of sticks burning on the ground, and two or three small tents pitched, and several asses grazing close by. The woman who had kidnapped her, told her not to cry, and no harm should happen to her; that she should be taken to a grand city, and sold to some great prince or princess, and live in splendour and riches all her life; but if she tried to escape, or give any alarm, she should be murdered. As soon as the woman had concluded this speech, the

gipseys took down their tents, and packed up everything, and loading their donkeys, set off without delay. The little princess was put on the back of one of the asses that carried the bedding, and in this manner she rode very comfortably, but was much frightened and very unhappy. She looked all around in hopes of seeing her two daws, but they were not to be seen. She was afraid the gipseys would steal her ring; so she took an opportunity, when she was not observed, to slip it into the folds of her hair, under her turban, and fastened it there. They travelled in this way till some time after dark, when they halted in a retired wood, where they lighted a fire, and pitched their tents. The gipseys sat down to a very good supper, of which the princess partook, and afterwards she slept in one of the tents.

The princess wakened very early in the morning, and seeing the gipsey-woman and children who slept in the tent with her fast asleep, and the door of the tent open, she stepped softly out, thinking to run away, but was stopped on the outside by a growl from a large dog, which lay a few yards from the tent-door. She saw that if she attempted to escape, the dog would fly



at her, or, at least, waken all the gipseys by his barking; so she stood quite still, and the dog lay quiet, only keeping his eyes fixed on her. Just then, she heard a woodpigeon cooing in a tree overhead, and looking up, she saw the bird perched on a bough just above her. She immediately drew the ring out of her hair, and held it up to the pigeon, making a sign to it to come down and perch on her arm, which it

did. Then, for fear of awakening the gipseys, she whispered to the pigeon to fly to the old fisherman's hut, and tell the parrot and the daws what had become of her; and cutting off a lock of her hair, she told the pigeon to take it to the old fisherman as a token. Away flew the pigeon, and the princess returned into the tent, and lay down again, carefully hiding the ring in her hair as before. By and by the gipseys

got up, and prepared breakfast, after which, everything was packed up, and they resumed their journey, the princess sometimes walking with the gipsy children, and, when she was tired, riding on one of the asses. The gipsy woman who had stolen her often talked to her, and told her how well off she would be if she was bought as a slave by some great prince at Lahore, where they were going. So they journeyed all day, only stopping to dine and rest, during the hottest part of the afternoon, in a shady grove of trees. A little before sunset, they came to a wood, where there was a spring of water, and here they unloaded the asses, and made preparations for passing the night. The princess was allowed to walk about by herself, but the dog that had watched her in the morning was ordered by signs to go with her; and he seemed to understand very well that he was not to let her escape, for if ever she quickened her pace, or seemed to be going too far from the tents, the dog began to growl.

At last she sat down under a tree at the outskirts of the wood, and as she was looking towards the way they had come, she saw what seemed a strange looking bird flying towards her: as it came nearer, she saw it was not one bird, but three, all flying in a bunch together; and when they came still nearer, she saw that it was her dear old parrot and the two daws. The two daws held the two ends of a stick in their claws, and the parrot held the middle of it in her beak, and by the support of the stick, and helping herself along by flapping her wings, she made a very good flight of it. As soon as they were within hearing, the little princess began to call out to them, and when the parrot heard her voice, she let go the stick and flew down to the princess, and, perching on her shoulder, kissed her over and over again. The two daws, too, dropped the stick and came down and perched on a bush out of the dog's reach, and told the princess how glad they were to see her again. They told her also how the woodpigeon had brought news of what had become of her to the fisherman's hut, and that they had immediately set out after her, asking all the birds they met whether they had seen her, and so tracing her out without much difficulty. They said that the old fisherman seemed to under-

stand they were gone to find her, and had received the lock of hair in token that she was alive and safe.

While she was thus eagerly talking with her birds, she did not perceive that two of the gipsy children, who were a little older than herself, had stolen after her behind the bushes, till they suddenly rushed out, and before the parrot could fly out of their way, they had caught her, and began to run back to the tents with their prize, crying out that they had caught a parrot. The princess followed, crying, and begging them to give back her parrot, but they did not mind her. However, just as they came to the tents, and as the elder gipseys came out to see what was the matter, the parrot managed to bite their fingers, so that they let her go, and she flew up into a tree out of their reach. The gipsy woman asked what was the matter, and the princess told her that the parrot was hers, and had found its way after her all the way from home, and that the other children had taken it from her; and she cried very much, and said the parrot was the only friend she had, and begged the woman to let her have it. "Well," said the woman, "if you will be a good girl, and not make yourself unhappy, so that you may look well and fat when we come to sell you at Lahore, you shall keep your parrot." She then ordered the other children not to meddle with the parrot, which then came down from its tree. As for the two daws, they kept always not far off, in case of need.

Before going to bed that night, the gipsy woman brought some leaves out of the wood and boiled them in a pot, and with the liquor she washed the princess's face, and arms, and legs; and her skin turned as brown as that of the gipseys themselves. "There, my dear," said the woman, "you will now pass for a gipsy; if people saw you with that pretty white skin of yours, they would guess you did not belong to us, and we should not be allowed to keep you." When the princess was in bed the parrot roosted by her side, and before she went to sleep comforted her as well as she could, and told her that she need not be afraid of the gipseys, who would be sure to use her well that she might look well when she came to be sold, and bring a good price.

And so it was; for the gipseys were

very kind to her, and took great care of her. They travelled on many days, pitching their camp at night in quiet, out of the way of public places. The princess often saw her two daws flying over head, but she took no notice of them, for fear of being seen by the gipseys. One afternoon the whole party were sleeping in the shade, when the princess was awakened by the parrot pinching her ear with her bill. As soon as she opened her eyes, she saw the two daws fluttering and screaming amongst the branches of a thicket not far off, and crying out—"A tiger! a tiger! Awake! awake!" "Wake the gipseys," cried the parrot, "or the tiger will be upon us." The princess jumped up, and began screaming as loud as she could—"A tiger! a tiger! Awake! awake!" and the gipseys were soon awakened.

At this moment, the princess saw the eyes of the tiger glaring at her from under a bush, but, just as he was going to spring, one of the gipseys caught up a bundle of dry

reeds, and lighting it at the fire where the pot was boiling, flung the reeds all in a blaze into the tiger's face, which so frightened him; that he turned off with a loud roar, and bounding across the plain with great swiftness, was out of sight in a very few minutes.

The next day they left the wooded country and entered on the desert. They travelled all day without seeing a living creature or a living plant. It was one vast plain of dry sand, and the only sign they saw of any living thing having ever been there before, was the skeletons of camels and horses, and once or twice, the skeletons of human beings lying half-buried in the sand. They pressed on with all speed, for they knew that it was a long way to the nearest well, and that unless they could reach it, they must perish with thirst. They were already suffering very much from drought, and the poor donkeys were almost exhausted, when they saw a clump of palm-trees at a distance, and the gipsy woman told the



princess to cheer up, for the well was under those trees. The donkeys seemed to know it, for they pricked up their long ears and began to bray and to quicken their pace. It took them, however, a long time to reach the trees, and by the time they got there they were all, both men and beast, quite exhausted, and could barely drag themselves to the well. The first gipsy that reached it looked eagerly in, but there was not a drop of water to be seen—the well was dried up. They were all struck with despair, for they knew there was no other well within many miles, and

they were dying of thirst and unable to move a step. The parrot was dreadfully alarmed, but seeing the two daws perched in one of the palm-trees, she flew to them, and begged them to fly about in all directions, and try whether they could find water, or their poor princess would perish with thirst. The daws flew different ways, and after some time came back and told the parrot they could not find any water, but they had been fortunate enough to find a number of water-melons growing in a valley not far off.

(To be continued.)

REVIEWS OF NEW PUBLICATIONS.

Familiar Letters on Chemistry, in its relations to Physiology, Dietetics, Agriculture, Commerce, and Political Economy. By Justus Von Liebig. Third Edition, revised, and much enlarged. London: Taylor, Walton & Maberley.

FROM the treatment which Chemistry too often experiences from literary gentlemen of the *Dryasdust* school, one would never be led to suppose that it may be made one of the most interesting of the sciences. A perusal of Liebig's latest work, containing the fruits of his long, varied, and most brilliant researches, is enough to satisfy the most sceptical as to the possibility of popularising the higher original productions of the scientific mind. But, then, philosophers like Liebig do not treat all emanations of the popular faith as mere subjects for contempt; they believe that there is commonly some substratum of truth in all faiths that have penetrated deeply into the intellects of a people; and the inevitable consequence is, that when some striking discovery shows to the people what that substratum was, and how far error was based upon or mixed with it, the teacher and the taught feel they rightly understand one another, and both are strengthened by the existence of such mutual ties. What scorn, for instance, has been lavished upon the alchemists! How many scientific smatterers have thought themselves privileged to treat these idealists of the middle ages as imposters in science, and cheats in their pecuniary relations with society! or, if not that, then at all events, as mere credulous simpletons, wasting their fortunes, energies, and health in the search after absurdly impossible things. How different is the view of Liebig! *Alchemy*, he says, *was the chemistry of the time, and the only possible one.* It was, therefore, the foundation of modern chemistry; and as to the credulity of the alchemists in believing in the possibility of triumphing over the difficulties in their path, he says that the wonders of modern science exceed their wildest dreams.

THE WONDERS OF SCIENCE.

"Many of the fundamental or leading ideas of the present time appear, to him who knows not what science has already achieved, as extravagant as the notions of the alchemists. Not, indeed, the transmutation of metals, which seemed so probable to the ancients, but far stranger things are held by us to be attainable. We have become so accustomed to wonders, that nothing any longer excites our wonder. We fix the solar rays on paper, and send our thoughts literally with the velocity of lightning to the greatest distances. We can, as it were, melt copper in cold water, and cast it into statues. We can freeze water into ice, or mercury into a solid malleable mass, in white-hot crucibles; and we consider it quite practicable to illuminate most brightly entire cities with lamps devoid of flame or fire, and to which the air has no access. We produce, artificially, ultramarine, one of the most precious minerals; and we believe, that to-morrow or next day some one may discover a method of producing, from a piece of charcoal, a splendid diamond; from a bit of alum, sapphires or rubies; or from coal-tar the beautiful colouring principle of madder, or the valuable remedies known as quinine and morphine. All these things are either as precious or more useful than gold. Every one is occupied in the attempt to discover them, and yet this is the occupation of no individual inquirer. All are occupied with these things, inasmuch as they study the laws of the changes and transformations to which matter is subject; and yet no one individual is specially engaged in these researches, inasmuch as no one, for example, devotes his life and energies to the solution of the problem of making diamonds or quinine. Did such a man exist, furnished with the necessary knowledge, and with the courage and perseverance of the old gold-makers, he would have a good prospect of being enabled to solve such problems. The latest discoveries on the constitution and production of the organic bases permit us to believe all this, without giving to any one the right to ridicule us as makers of gold."

In his first letter, Liebig discourses on the importance of chemical science, warning us, at the same time, from forgetting that, without theoretical science of any kind—properly so called—our forefathers achieved much that was of the greatest importance to their and to our welfare.

PRACTICAL PRECEDING THEORETICAL SCIENCE.

"They determined the duration of the year, explained the changes of the seasons, and calculated eclipses of the moon, without any acquaintance with the laws of gravitation: people have built mills and constructed pumps without knowing anything of atmospheric pressure; glass and porcelain were manufactured, stuffs dyed, and metals separated from their ores by mere empirical processes of art, and without the guidance of correct scientific principles. Even geometry had its foundation laid in experiments and observations; most of its theorems had been seen in practical examples, before the science was established by abstract reasoning. Thus, that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the

other two sides, was an experimental discovery, else why did the discoverer sacrifice a hetacomb when he made out its *demonstration*?"

But whilst thus doing justice to the men of less favourably situated eras, the Baron appreciates rightly the wondrous character of our own time, especially as regards its most distinguishing trait—the diffusion of knowledge. With a kind of quiet exultation, he remarks thus on

THE DIFFUSION OF USEFUL KNOWLEDGE IN
ANCIENT AND MODERN TIMES.

"In our schools mere children are now taught truths the attainment of which has cost immense labour and indescribable efforts. They smile when we tell them that an Italian philosopher wrote an elaborate treatise to prove that the snow found upon Mount *Ætna* consists of the same substance as the snow upon the Alps of Switzerland, and that he heaped proof upon proof that both these snows, when melted, yielded water possessed of the same properties. And yet this conclusion was really not so very palpable, since the temperature of the two climates so widely differ, and no one in those days had any notion of the diffusion of heat over the surface of the earth. When a schoolboy takes a glassful of liquid, and, placing a loose piece of paper over it, inverts the glass without spilling a drop of its contents, he only astonishes another child by his performance, and yet this is the identical experiment which renders the name of Torricelli immortal. It is a variation of that experiment with which the burgomaster of Magdeburgh (Otto von Guericke) threw the Emperor and the princes of the empire at Ratisbon into speechless astonishment. Our children have more correct notions of nature and natural phenomena than had Plato! they may treat with ridicule the errors which Pliny has committed in his *Natural History*!"

What is chemistry? is a question that one often feels impelled to ask, as we see it encroaching upon the territories of what we previously thought different, though nearly allied sciences. We shall try to answer this, with the Baron's help, in a manner that we hope will be satisfactory to those, who, like ourselves, have felt so much in doubt as to the true limits of chemistry, as to be sometimes tempted to ask—Has it any limits at all? Does it not, in fact, include all the other sciences?

WHAT CHEMISTRY IS.

"She teaches the methods of discovering and determining the qualities of the various substances of which the crust of the earth is composed, and which form the constituents of animal and vegetable organisms. We study the properties of bodies, and the alterations they undergo in contact with others. All our observations, taken collectively, form a language. Every property, every alteration which we perceive in bodies, is a word in that language. Certain definite relations are manifested in the deportment of bodies toward

each other; we observe a similarity of form, or analogy of properties, or diversities in both respects. Such diversities are as numerous and various as the words of the most copious language, and they are no less varied in their signification, and in the relations which they bear to our senses.

"Bodies differ in quality; the meaning conveyed to us by their properties—to pursue the illustration—changes according to the mode in which these elements are arranged. As in all other languages, so we have in that language in which material bodies hold converse with us, articles, substantives, and verbs, with their variations of cases, declensions, and conjugations. We have also many synonyms: the same quantities of the same elements produce a poison, a remedy, or an aliment, a volatile or a fixed body, according to their manner of arrangement.

"We know the signification of the properties of bodies, that is, of the letters and words in which nature speaks to us, and we use the alphabet to decipher and to read them; as, for instance, a fountain of mineral water in Savoy cures that remarkable enlargement of the thyroid gland denominated *goitre*—I put certain questions to that water, the combination of the several letters in its answers informs me that it contains *iodine*. A man, having partaken of some food, dies soon after, with all the symptoms of poisoning. The language of phenomena, with which the chemist is familiar, tells him that arsenic, or corrosive sublimate, or some other body, was the cause of death.

"The chemist, by his questions, compels a mineral to speak, to disclose its composition; it tells him that it contains sulphur, iron, chromium, silica, alumina, or any other word of the chemical language of phenomena, arranged in a certain order. This is *CHEMICAL ANALYSIS*.

"Then, again, the language of phenomena leads the chemist to new combinations, from which he derives innumerable useful truths, that are applicable to the improvement of manufactures and arts, to the preparation of remedies, and to metallurgy. He has succeeded in deciphering the word *ultramarine*. The next step is to construct this word in a tangible form, to reproduce *ultramarine* with all its properties. This is *APPLIED CHEMISTRY*."

Innumerable are the uses referred to in these last words "*applied chemistry*," and yet is the number hourly increasing. The physiologist and physician have hitherto been chiefly guided by external forms and physical properties; now they know that they must obtain a chemical insight into the composition and changes of the subtlest elements of the organic bodies with which they have to deal. How else can they venture even to offer an opinion—much less, as in the physician's case, to attempt to act—upon phenomena related to the laws of life, the vital processes, and the removal of abnormal states of the organism? For instance, has not that power which seems to lie at the very base of all organic life, worked in secret, unknown, unsuspected

by man, through the whole of his past history—even during that period in which he has to some extent pursued the study of himself? Of course, we refer to

ELECTRICITY.

"A thousand years elapsed from the birth of natural philosophy, ere the human mind had obtained the slightest notion of the existence of this, the most stupendous power in nature, a power performing the most important part in all the alterations of inorganic matter, and all the processes of vegetable and animal life. The philosopher, undeterred by innumerable difficulties, has at length obtained, as the reward of his untiring researches, a most intimate knowledge of electricity, and has made it his handmaid. By a knowledge of electricity he is enabled to direct the course of the lightning, and to extract the noble metals from the poorest ores. By means of this force he was first enabled to ascertain the true nature of the constituents of the solid matters of our earth: with it, or with the allied influences, he sets ships in motion, and multiplies costly objects of art!"

It is well known how much commerce and the arts have already derived from the progress of chemistry. Mineralogy has become a new science, since regard has been had to the composition of minerals, and the chemical relations of their constituents. Geology will probably receive great accessories of light from the same quarter. Agriculture henceforth relies upon chemistry as its chief support; and no wonder, since it is chemistry alone that can instruct it as to what are the actual constituents of the soil and of plants, and of what the first ought to be to afford the highest possible nourishment and health to the second. So, of the animal body, and its food. Dietetics must now be taken as almost synonymous with the chemistry of food. It is chemistry that tells us of the composition of blood in a healthy state, and of all the conditions requisite to the due sustenance of the frame. Waste and repair—rest and activity—sleep and watchfulness, all are directly dependent upon chemical influences. In short, chemistry alone can tell us how rightly to live.

We shall return to this important volume.

The French Teacher. By Désiré Pontet.
London and Dublin: S. J. Machen.

In three different publications, entitled respectively, *The First French Teacher*,—*The French Teacher, Second Series*, *L'Echo des Salons*,—and *The French Teacher, Third*

Series, M. Pontet has developed his system of tuition. And as it is one great object of these Reviews of New Publications to enable our readers to get at a tolerably correct notion of what a book really is, and so to be able to judge for themselves of its utility to them, we shall shortly describe the respective objects of the three books, and the salient points of M. Pontet's method.

The *First French Teacher* (containing 107 pages) is strictly elementary. It commences with a series of dialogues relating to the most familiar objects of ordinary life, and, of course, including the words that it will be most useful to know at the outset. On the right-hand page these dialogues are presented in French, with a literal interlinear translation, and which is also something more, for it shows where the literal departs from a just translation. By means of accents, and other marks, the French portion affords considerable help to the right pronunciation. This page well conned over, the learner turns over the leaf, where he finds, on the left hand, the same dialogues, verbatim, but in French only, which he now tries to read. When he stumbles, of course he turns back to the page with the interlinear translation, and then again goes on. This mechanical arrangement is very good. The dialogues are followed by some stories, and the whole is concluded by an interesting French Grammar.

In the second series, *L'Echo des Salons*, (192 pages,) the wants of a higher class of students are studied. This volume consists, first, of an immense number of the most familiar phrases used in conversation; and secondly, of a Dictionary, containing every word used in the dialogues, with the pronunciation based on English sounds, as in Walker.

In the third series, the pupil is taught how to translate his own native tongue into the French. This is done very ingeniously. The same dialogues, which were given in French in the second series, are here given in English—the proper, not the literal English—so that each work acts as a key to the other. After every word or phrase of the English proper, literal English, or the words which require to be translated literally into French, to form the proper French, are given. This method is so ex-

cellent, that we shall let the author illustrate it himself. We will first give two lines from the original French in the second series, omitting the various marks, which explain the pronunciation—

“Où allez-vous? Je vais à la maison. Voulez-vous venir avec moi? Allons ensemble. Eh bien, où irons-nous?”

Next, the same sentence from the third series—

“WHERE are you going? (GO YOU) [v. 8 D]. I am going (GO) home (TO THE HOUSE). Will [v. 103 D] you come with me? Let us go together. Well, where shall we go? (WE).

EXPLANATION.

“The pupil, in order to read a sentence in good English, has only to take the *Italic* and *Roman*, or *Roman* and *Italic* words.* And to facilitate the translating of English into French the pupil is to translate those words which are in *Roman* and *Small Capital* letters, the latter is enclosed in parenthesis (), passing over the *Italic* words, which are introduced to make good English: thus, in the first sentence of Lesson I:—

“Where are you going (GO YOU [v. 8 D])?”

To produce good French for the above sentence, the pupil, by taking the *Roman* and *Small Capital* words, reads it thus:—

“Where GO YOU [v. 8 D]?”

The figure 8 refers to No. 8 of the Tables of the French Verbs, and the letter D after the figure points out the indicative mood, present tense of the verb; thus it is translated by *Où allez-vous?* Where go you? or, in good English, Where are you going?

— “I am going (GO) home (TO THE HOUSE).”

By taking the *Roman* and *Small Capital* words of this sentence, the pupil finds out that he is to translate into French only the words,

“I GO TO THE HOUSE.”

which he does in a moment, by “*Je vais à la maison.*”

A literal translation of each word is adopted, in many instances, for the purpose of assisting the student, in preference to notes at the foot of the page, giving the entire phrase in French, which learners are disposed to copy without any impression being left on their minds; whilst by a literal translation of the idiomatic phrases, the difference of idiom between the two languages is apparent, and at the same time, instructive.

The third series has also its dictionary, but in this case it is English—French; whilst the previous one was French—English. Complete tables of the French verbs, and a new Syntax, wind up the whole.

The British Controversialist. London: Houlston & Stoneman.

FOR mere disputation we have neither love nor respect. If a man does not discuss for the sake of discovering what is true, he had better a thousand times never discuss at all. And if he does really seek the truth, he is sure to be in earnest. Taking a side, therefore, in a controversy has always seemed to us a sheer abuse of time and intellect, and as indicative of lack of principle. But, if a man says to two other persons holding opposite opinions upon matters of consequence, “I should like to hear what each of you have to say, in order that I may have the better chance of arriving at the truth,” that is an eminently philosophical course, and one that can hardly fail to produce beneficial results. Such a course the projectors of the *British Controversialist* have taken, only it is the public who sit in judgment upon the various cases brought forward; the character of which may be judged from the following instances:—Is Sectarianism Christian? Which most deserves the esteem of mankind, the poet or the legislator? 1. Is Mesmerism true? Is language of human or divine origin? Was Oliver Cromwell a first-rate general, a great statesman, and a sincere man? 2. Can the Government interdict the establishment of the Roman Catholic hierarchy, consistently with the principles of religious liberty? 3. Ought the Government to provide a secular education for the people? 4. Is it desirable that the revenue of this country should be raised on a system of direct taxation? Have the working-classes been benefited by machinery? 5. Is it more reasonable and beneficial to subsist on a vegetable diet, than on one of flesh and vegetables? &c. We have transcribed these questions, as they may furnish hints for friendly discussion, of a more private character, among our own readers. We should especially recommend those marked with the figures 1 to 5. If the other questions be taken up for discussion, the form should, we think, be altered. We do not want to entangle ourselves among verbal subtleties, such as must be raised from the discussion about sectarianism and Christianity, or such ideal subtleties as should be involved in the vague and unfruitful

* Where—is in Roman letter; are you going—is in *Italic*; and GO YOU—in *Small Capital* letters.

contrast of the poet and legislator. The question relating to machinery refers to a most important topic, but this is not the way to put it. The effects of machinery generally, including its effects on the working classes, would be a more suitable form. Machinery may be an admirable thing, and yet may have temporarily injured the working classes. It may be admirable, even while calculated, under the existence of certain social conditions, to permanently injure the working classes, but then it would be the conditions that would be wrong, not the machinery. The effect of the present mode is to compel every one to bring the answers to a Yes or No, which is precisely the wrong conclusion to be come to in hosts of cases. Our social arrangements are, as yet, so imperfect—our knowledge is, as yet, so partial, that we must be constantly on our guard against the inevitable tendencies of that imperfection and partiality to re-create themselves in fresh forms.

The *British Controversialist* possesses various other features of interest to the student. The following passage presents a fair example of the ability occasionally found in its pages:—

A LITERARY MAN'S CONSTITUTIONAL EXPERIENCE.

“Having originally a good constitution, and previously accustomed to considerable exercise in the open air, for the first few months of studious application I succeeded very well; but, as I went on, I gradually lost that vigorous healthy stamina which I had before enjoyed, and by the time I ought to have been ready to apply the result of my study to public service, I could not trust to my memory; my nervous system was so far weakened as to render public speaking, which had previously been, on other subjects at least, comparatively easy, an almost insurmountable task; and where it was accomplished its effect was, to me at least, of a very unsatisfactory character. I had always been accustomed to look *within* rather than *without*, for strength to overcome difficulties. I seriously considered what had been the cause of this failure in my endeavours. I felt sure that my want of success was not owing to either apathy or indifference, but a sheer loss of physical and mental power! I determined, therefore, to adopt a new course of discipline. I had studied the philosophy of Pythagoras, and others of this school, and I discovered that the success of these men had been attributable, first, to their simplicity of diet, entirely abjuring *all animal substances*, and living upon fruits, vegetables, and farinacea; secondly, early rising; and thirdly, vigorous *physical* as well as mental exercise. I had previously adopted, to some extent, the first of these, and to this I mainly attributed the healthy and vigorous condition

which I enjoyed previously to sedentary occupation; but I now came to a determination that, (notwithstanding the influence of friends whose judgment I had every reason to highly esteem; who considered that a partial use of animal substances, such as eggs, butter, cheese, cream, and milk, was necessary, or at least desirable,) I would give the Pythagorean system a complete trial. Accordingly, I adopted a simple diet, consisting of a few plain but wholesome farinaceous preparations; good wheat-meal unfermented bread, with vegetables and fruit; my only drink being ‘the crystal beverage.’ So important did I conceive this course to be, that, in order that I might avoid every temptation to a different mode of life, I retired to a small country town, beautifully situated on a rock of stone, where, although still continuing my literary labours, to a considerable extent, I gradually acquired strength, by taking daily an amount of physical exercise, for which the beautiful hills and wooded groves of the neighbourhood were delightfully adapted. Although at first my ability to walk extended to only two or three miles at a time, I gradually acquired strength, so as to walk eight or ten miles a day. In the course of five weeks I had made so much progress as to feel able to take a pedestrian tour; and being then in the West of England, I joined a party of three gentlemen, and we took several routes over the beautiful counties of Hereford, Gloucester, and Monmouth. I now found that I could accomplish twenty-five or thirty miles a day, without experiencing much inconvenience. I then took a route by myself, from Ross in Herefordshire to Tintern Abbey, along that most beautiful of English rivers, the Wye. It was a warm autumnal day; the trees were just changing the colour of their foliage: the birds sang delightfully amidst their branches; and the interest which I felt in the slightly winding river, and the course of the wood-covered hills, was such as I had seldom or never before experienced; and although carrying a considerable load in my knapsack, I reached those beautiful old ruins, after walking upwards of twenty miles without stopping. After examining these celebrated remains with intense interest, I took my course to Chepstow, through that most magnificent portion of the valley where the hills assume rather the form of cliffs of the most imposing, yet beautiful character, clothed as they were with foliage of every shade, from the tint of the faded oak, to that of the dark green holly tree. In scenes like these, the memory could not but be deeply impressed, and the mind became reanimated and fitted for exertion. After a few weeks’ pleasant rambling, but still attending to my avocation, I retired to my home, vastly improved in health and spirits, and more than ever determined to persist in the discipline of the Pythagorean school; retiring to rest between the hours of nine and ten, and rising at from four to five o’clock in the morning,—bathing the whole body with cold water, and applying friction to the skin,—both mind and body became capable of intellectual and physical labour. I adopted the following as my daily course:—Being winter time, the first two or three hours were devoted to literature. At this early period of the day, the mind seems freer and less liable to distraction, and my work went on more satisfactorily than ever it had done before. My breakfast consisted of a preparation of rice, or some other light farinaceous substance, with brown

bread, and a little fruit. I then took two or three hours' exercise in my garden. My dinner consisted of two or three kinds of simply cooked vegetables, a farinaceous preparation, and sometimes fruit, always with the unfermented wheat meal bread. I found that after such meals as these, if I did not exceed in quantity, (and it is easy not to do this with unstimulating food,) I could apply myself with the greatest ease, and considerable vigour, to my literary labours, which I usually did for three or four hours. My evening meal, at six o'clock, was similar to that of the morning, only somewhat less in quantity. Evening was spent in either reading, conducting classes, or lecturing, as the case might be; and although, at the commencement of this course of discipline, I invariably used notes for my lectures, and seldom spoke with much effect, I found now that my *memory was greatly improved*. I altogether abandoned reading lectures, or referring to notes, and I found that I could go through a lecture on an historical subject, after once or twice reading the history, with ease and pleasure to myself and audience, without reference to any notes whatever. My avocations, once burdensome and wearying to both mind and body, were now sources of the highest enjoyment.

"I continue the course above described, with a little variation as the seasons advance; finding it better to take my exercise at three different periods of the day, about an hour before each meal, than to take it, as before, in three successive hours.

"Thus, my own experience completely confirms my belief, that the best method of cultivating the memory, is to promote, by abstemious habits, early rising, and daily physical exercise, that healthy condition of both body and mind which renders *all* the functions of life active, and at the command of their possessor. The real enjoyment with which such a life is replete, should be made known to *all literary men*, and especially to those whose high office it is to minister to the spiritual necessities of the human race.—*A Disciplinarian.*"

GENIUS AND ACCOMPLISHMENTS.—Corneille did not speak correctly the language of which he was such a master. Descartes was silent in mixed society. Themistocles, when asked to play on a lute, said, "I cannot fiddle, but I can make a little village and a great city." Addison was unable to converse in company. Virgil was heavy colloquially. La Fontaine was coarse and stupid when surrounded by men. The Countess of Pembroke said of Chaucer, that his silence was more agreeable to her than his conversation. Socrates, celebrated for his written orations, was so timid that he never ventured to speak in public. Dryden said that he was unfit for company. Hence, it has been remarked, "*Mediocrity can talk; it is for genius to observe.*"

LIFE OF JOHN HUNTER.

JOHN HUNTER was born at Long Calderwood, in the parish of Kilbride, Lanarkshire, on the 14th of February, 1728. The exact date of his birth is somewhat uncertain: his register makes it Feb. 13th. He himself considered it the 14th; and it is on this day that the Hunterian oration is annually delivered at the Royal College of Surgeons. His father was a small farmer living on his own estate, his mother the daughter of a respectable citizen of Glasgow. John was the youngest of ten children; and his father dying when he was only ten years old, his education, through the injudicious fondness of his mother, was very much neglected. He seems, in consequence, to have preferred the sports and pastimes of a country life to any more profitable occupation. He continued to live at Calderwood until his 17th year, when he went to stay with his brother-in-law, Mr. Buchanan, who was a cabinet-maker at Glasgow. It would appear that he worked at this trade for nearly three years; when, being dissatisfied probably with the life he was then leading, or feeling within himself a capacity for a far higher and more extended sphere of utility, he wrote to his brother William—who at that time had gained considerable celebrity as a lecturer on surgery and anatomy—to offer himself as an assistant in the dissecting-room. The reply was satisfactory, and accordingly he lost no time in finding his way to London, the seat of his brother's labours.

It was, perhaps, at a fortunate period for a mind constituted like that of John Hunter, that he entered upon his anatomical career. In the early days of surgery a great prejudice existed against dissection, arising as much from ignorance as superstition. Under these circumstances, it was impossible that that necessary knowledge could be gained which would lead to inquiry and development. Attempts were indeed occasionally made by some more daring adventurer, to increase the stock of anatomical knowledge, but the prejudices and opposition raised by the Romish Church checked any progress. At this time, physic and surgery were practised together; but, about the middle of the 12th century, surgery was severed from

physic by the edict of the Council of Tours, prohibiting the clergy (who then shared with the Jews the practice of the healing art in Christian Europe) from in any way causing the effusion of human blood—at least as a means of curing bodily ailment. Physic, or as it is now understood, the science of medicine, received by this some little encouragement, and surgery was, in consequence, abandoned to the uneducated laity; and, falling into the desperate hands of the barber, the farrier, and others of that description, sunk into a deplorable state of prostration. And while those who thus embraced physic, having no impediment, ransacked nature for the means of cure or relief to suffering humanity, anatomy, by which alone surgery could be conducted on sound principles, was left utterly neglected: it became, in short, a mere matter of plasters and unguents.

At the revival of learning, some advance was made; yet even this was principally owing to the reproduction of that knowledge which the ancients had gained; but when the spell by which the pope bound the Christian world in ignorance had, in this country at least, been roughly broken by the clear and strong minds that brought about the Reformation, some few names appeared to adorn the hitherto degraded art—as in the case of Wiseman, by some called “the true father of British surgery,” and our own immortal Harvey; but the difficulties of procuring bodies for the dissecting-room rendered the formation of a great National School an object not easily attainable. Even in London, no regular courses of anatomy were given prior to 1746. Surgery and physiology made, therefore, but little advancement.

At this critical juncture, when the field of inquiry was fully open, John Hunter appeared; and it was, perhaps, fortunate that the circumstances of his life led him to the practice of surgery: his natural inclination and thirst after this particular kind of knowledge, combined with a peculiar aptitude for its acquirement, so well qualified him for its pursuit.

The education for the profession, as regards anatomy, had hitherto been so deficient, that a body of naval surgeons, urged by the desire of improvement, engaged Sharpe (an anatomist of repute) to deliver periodical courses of lectures to

them; and they, for this purpose, hired a room somewhere near Covent Garden. William Hunter succeeded Sharpe in 1746, and gave so much satisfaction that he was induced, in consequence, to extend the plan so as to bring it to be a perfect school of anatomical instruction. He had lectured about two years when John was admitted into his dissecting-room, being then twenty years of age. After a short interval of study, “to ascertain his ability for the task, it is said that William gave him an arm to dissect for the muscles, the perfection of which, for a first attempt, excited much approbation.” His whole time was thenceforward devoted to the acquisition of anatomical knowledge; and he so soon became master of the subject, as to be qualified to demonstrate and teach in the winter of 1749.

John had now found an unexpected path leading to fame open before him, and that without any other choice; for an uneducated man is necessarily restrained in his selection of the occupations of life; and the necessity in this case was so far fortunate, as the pursuit of anatomy is not much retarded by the want of education.

Being naturally of a very active and industrious turn of mind, he pursued his career with unceasing diligence. An opportunity occurring, he placed himself as a pupil under Cheselden, at Chelsea Hospital, with whom he continued for two years. He then went to St. Bartholomew's, and for some time took advantage of the instruction and experience of Pott.

In 1753, Hunter entered as a Gentleman Commoner at St. Mary's Hall, Oxford, probably with a view of embracing physic as a profession. This step seems to have been taken in accordance with the wishes of William, who had himself received a classical education, and might have intended his brother to experience the same advantage. But John did not appear to have much inclination for the studies of the place, as, at a subsequent period of his life, in allusion to his having been at Oxford, he remarked to Sir Anthony Carlisle—“They wanted to make an old woman of me, or that I should have stuffed Latin and Greek at the University;” but, added he, significantly pressing his thumb nail on the table, “these schemes I cracked like so many vermin, as they came before me.”

With such an impression, he neither did nor had any desire to follow up a system of education, for which, by nature, he was not adapted, and which, by fettering the freedom of thought, might only tend to damp his ardour for those pursuits more congenial to him.

In 1754, Hunter entered as a pupil at St. George's Hospital, and two years afterwards was made house surgeon. In the former year his brother had made him his partner in the school, and he continued to deliver a part of the annual course of lectures there, until 1759. He had now been upwards of ten years engaged in the study of anatomy; during the latter part of this time he had often suffered from severe indisposition, in consequence of his constant and severe labours in the dissecting-room. His health became seriously affected—so much so that he was advised to seek a warmer climate: with this view he obtained an appointment on the staff of the army; and in 1761 he went with the armament ordered to lay siege to Belle Isle, under Commodore Keppel and General Hodgson; but he did not allow his duties to interfere with his studies, which he still continued to prosecute with his wonted perseverance. He afterwards went to Portugal, where he remained with the army until 1763. The events of this campaign gave him the opportunity of making observations on gun-shot wounds; these were not published until many years afterwards, being then incorporated with some of his other works.

The termination of the war brought Hunter back once more to the sphere of his former exertions. His health had been completely restored; and he determined at once upon settling in London, and commencing practice as a surgeon. For this purpose he took a house in Golden Square, and opened a room also for dissection and demonstrations to pupils. He is described at this time as a companionable man, fond of his joke, and not averse to the enjoyments of the table; but he soon found that such a life was incompatible with those pursuits to which his passionate desire for knowledge led him, and he readily yielded to his own predilections.

At first he met with very little success in his profession; his manners were rough, and his address unpolished—drawbacks to success in any profession, but more par-

ticularly, perhaps, in the medical. And, besides, there was then no opening for him; Hawkins, Bromfield, Sharpe, and Pott, embraced almost the whole of family practice, whilst Adair and Tomkins carried off all that could be gained by their connexions formed in the army. He felt, therefore, that his sole dependence must rest on his anatomical power. But, though his talents were acknowledged, and his acquaintance with the subject varied and extensive, his lecture-room was not much frequented, for he never had a class of more than twenty pupils. In fact, as a lecturer his language was bad, his manner embarrassed and altogether inelegant. Finding, therefore, his time unoccupied in his profession, his active mind suggested, about this time, the plan for those researches into the animal economy to which his labours were afterwards principally devoted. He clearly saw that Nature must be studied, not in detached portions, but as a whole; and that to understand thoroughly the human subject, it must necessarily be illustrated by means of comparative anatomy. As these inquiries could not conveniently be carried out in a crowded city, he purchased a small property at Earl's Court, about two miles from Brompton, at that time a rural spot.

He spent much of his time here, among the strange animals he had congregated together; and amused himself in observing their habits and instincts: he used occasionally to sport with them, and, as might be expected, his life was on more than one occasion in jeopardy, from some fiercer denizen brought from the forests and wilds of rarely explored regions. He sometimes communicated the result of these observations; and by the originality of conception which displayed itself in every inquiry he made, he added so much to his reputation that he was now chosen a Fellow of the Royal Society. In the year following, (1768,) a vacancy occurring on the retirement of Gataker, he was chosen surgeon at St. George's Hospital, and soon after was made a Member of the Royal College of Surgeons.

The appointment to the hospital was of the greatest service to him; he gained but little by his profession, and although his private expenses were trifling, he spent all he gained in adding to his collection. This gave him an opportunity of increasing his income, both by adding to his surgical

reputation, and by enabling him to take pupils, from whom he received large fees. His object was not, however, the mere accumulation of wealth; this idea never had any weight with him, for he regarded his gains only as a means by which he could carry on more extensively his scientific investigations, to which he was ardently attached, and which he had pursued unremittingly from the time of his first entering on anatomical studies. Among his pupils at this time was Jenner, with whom he remained throughout his life on terms of the closest intimacy, and Sir Everard Home, whose sister he afterwards married.

In 1770, he removed from Golden Square to Jermyn Street, into the house just vacated by his brother. In the following year, he published the first part of his *Treatise on the Teeth*, by which he elevated the position of the dentist to its proper rank, showing the importance of a general knowledge of surgery for even an isolated branch of it. Hunter's practice was now increasing, although even at this time he never realised a large income; so that his fame as yet rested more upon his character as a naturalist than as a surgeon.

In January, 1776, Hunter was appointed Surgeon Extraordinary to the King—a distinction which did not advance his pecuniary means; and, as his expenses in collecting materials for his museum were very great, his expenditure was more than his income could well afford. But he was not deterred by these considerations, and when his own means were not sufficient for the purpose, he used frequently to ask for assistance from his friends, as the following anecdote will illustrate. "Pray, George," said he, one day to Mr. G. Nicoll, the bookseller, with whom he was very intimate, "have you got any money in your pocket?" Mr. Nicoll replied in the affirmative. "Have you got five guineas, because if you have and will lend it to me, you shall go halves." "Halves in what?" inquired his friend. "Why, halves in a magnificent tiger which is now dying in Castle Street." Mr. Nicoll lent the money, and Hunter got the tiger.

In 1780 began that unfortunate misunderstanding with his brother William, which ended in a total rupture of all communication. This continued until almost the close of William's mortal career, who

never seems to have forgiven the occasion of it, which was a mutual claim to an important discovery; and as both were tenacious and neither would retract, a reconciliation never took place. At the death of his brother, which occurred about three years after, John found that he was entirely overlooked in the disposal of the property, which was considerable. Giving up, therefore, all idea of deriving advantage from that quarter, he relied more wholly on his own exertions; and the resignation of practice by Hawkins and Sharpe about this time, opened more extended prospects to Hunter. He took advantage of it, and as his collection also had very much increased, he removed from Jermyn Street to a larger and more commodious house in Leicester Square. A room of ample dimensions was here fitted up for his museum; and here—besides giving lectures and having weekly meetings, in which discussions took place on subjects connected with his profession—he established the society for the improvement of medical and chirurgical knowledge, which continued its useful career for upwards of twenty years.

The new situation he had chosen was convenient; here was the resting-place of the accumulated treasures he had heaped up during his life. Fortune had now, at length, smiled on his prospects; but as he had expended vast sums, and feeling that his future prospects might still be uncertain, he was anxious to provide against contingencies. In 1786, he was appointed Deputy Assistant Surgeon-General to the Army. His private practice now also materially increased—he had more consultations then, probably, than any other surgeon. In 1789, on the death of Adair, he succeeded to the offices of Surgeon-General to the Army and Inspector of Hospitals. Hunter had now arrived at the zenith of his fame. The views of his early life had now expanded into realities; he had seen the successful carrying out of many improvements in practice, which his own inquiries had suggested and his own experience approved of; and if at any time during his career his imagination had soared high, he could scarcely have hoped for a higher point of ambition.

Such is a brief outline of upwards of forty years of the life of John Hunter: but the mere chronological detail of the pro-

minent events of such a man, give but little idea of his place among the great characters that have adorned their station.

To estimate the man, it must be observed what impression he made on the period of his existence; what stamp of himself he has left behind; in what manner he has stereotyped himself on the age in which he lived. Here, indeed, lies his true character, and John Hunter can only be appreciated in such an estimate as may be thus made. Rude in his manner; rough in his speech; unable, through neglect of early education, to express himself with force or elegance either in speaking or writing; of an irritable and easily provoked temper; overbearing often in his demeanour to his equals, and little conciliatory even to others; addicted to the gross habit of swearing, in which he indulged on all occasions—he yet, with all these drawbacks, which might have checked any ordinary character, raised a name for himself far surpassing all monumental fame.

Early in his anatomical career, he had struck out the idea that it was impossible to arrive at just conclusions by confining his observations to the human frame alone. To gain a real and deep insight into the subject, it was necessary to ransack Nature's realms, and bring together from every quarter all those parts having a relation to each other. To this may, in a remarkable degree, be traced all his success, and all the fame he acquired. As a surgeon, he might have found his equal; as a naturalist, it was possible that others might have shared his reputation; but as a combination of the two characters, he stood alone.

Nor were his studies carried on with any ordinary degree of labour. Early and late he was to be found either handling his scalpel, or arranging some specimen of nature he might have acquired. He rose at four or five o'clock, and confined himself to his dissecting-room till nine. After his morning meal, he received his patients until eleven or twelve. He then went his rounds of visiting with a strictness of punctuality well worthy of imitation. He returned to dinner at four, the then fashionable hour; and then, after an hour's sleep, retired to his study with his amanuensis, and buried himself till past the midnight hour in the depths of his own researches. This was at the height of his career; but even at the outset his labours were intense

—so much so, as to render it necessary, after repeated attacks of illness, to seek a change of climate. In his situation with the army, while others might have been content to seek in repose the return to health, Hunter may be said to have commenced, not only those experiments of natural history which contributed so much to his success, but also the collection of those materials which formed the groundwork of his splendid museum. The campaign in Portugal opened to him a new sphere of inquiry, the result of which he subsequently made public. No opportunity seems to have been lost, or allowed even to pass neglected by. It is this that makes the man of science. With the mind to conceive, the foundation must be laid in labour, if the fabric is ever to be raised as the proud monument of fame—not the mere mechanical labour which might pile up a mound, but the skill and research to achieve a pyramid.

Hunter has been accused of plagiarism. As he preferred studying nature to books, it might happen that when any new idea was developed in his mind he was desirous of appropriating it as exclusively his own, though it is natural to suppose he had been often anticipated in these discoveries. He was tenacious of his claim, and urged it, perhaps, beyond due bounds; this disposition led him into disputes with others, and was also the cause of that quarrel with his brother which was never forgiven by the latter, and broke all the long and endearing ties of kindred and association. It may have been a failing, which must not be harshly judged of. Many leading members of the profession had, at that time, been content to jog on in the old routine of practice, which was clogged with ignorance and prejudice; Hunter had struck out a path for himself; by blending human and comparative anatomy into one comprehensive whole, he had enlarged the basis of surgical science, and might consequently be impatient if others, following his steps, should snatch from him those laurels he conceived to be justly his due.

Surgery, indeed, owes a deep debt to Hunter; he saw the fallacy of the harsh system of practice which had so long prevailed; he accordingly rejected it, and substituted a milder treatment, leaving Nature herself as much as possible to act

as a remedial agent: an example it would be well, even now, more extensively to follow for the sake of suffering humanity.

There are various opinions of Hunter's character as an operator. Some consider him to have possessed great skill, while others do not seem to have rated him highly. The truth, therefore, lies probably between the two extremes. And, if not very dexterous, he was generally considered sure; but he himself does not appear to have attached much importance to this point, as he used frequently to say, "To perform an operation is to mutilate a patient we cannot cure; it should therefore be considered as an imperfection in our art." A sentiment honourable to his feelings, and a convincing proof of the high standard of excellence to which he would, if possible, have raised the practice of surgery.

Hunter's correspondence with his pupil Jenner shows him to be a man of warm and kindly feelings; and this is also clear from the affectionate manner in which all who were at all connected with, clung closely to him, for through the roughness of the surface they could see the bright gem within. The many letters of his to his former pupil, which have been preserved, show, also, how constantly his mind was fixed on the one object before him—his devotion to the study of natural history.

Notwithstanding the success of John Hunter, scarcely at any time of his life was his income sufficient to cover the expenses he incurred; even on the occasion of his marriage with Miss Home, in 1771, a sister of Sir Everard Home, he was indebted to his treatise on the Teeth for the means of defraying the expenses necessarily attendant on such an event. Ambitious he might have been, but it was not by accumulation of wealth that he thought to raise himself; for he only looked upon money as a means of carrying out his researches, and making additions to his museum.

It was only towards the close of his life that he felt that his neglect in this respect had left his family unprovided for. Future generations have profited by it, as his museum, for which Government gave £15,000, besides subsequently an additional grant to give it accommodation, has now become the property of the public.

This monument of industry, which is not surpassed by any in the whole world, it

must be remembered, is the production of the exertion of one man. The amount of mere animal labour necessarily employed in the execution must have been enormous. And taking into consideration collateral occupation, it is indeed a subject of wonder as well as admiration. With such a head to guide, with such a hand to execute, the Hunterian Museum descends to posterity, a work which has no parallel.

Hunter had for many years suffered from *angina pectoris*, a disease at that time but little understood. The pain he often experienced only added fuel to his natural irritability: this increased towards the close of his life. So little control had he over his temper, that this alone was frequently the cause of a paroxysm of pain. It is melancholy to reflect, that an outbreak of passion should have been the proximate cause of his death. It may be imagined, from the little respect he had for many of his profession who were high in office, that he was not on good terms with them: this was more particularly the case with those he was connected with at St. George's Hospital. Several matters occurred which increased the schism, and when he attended the board meetings at the hospital, it was seldom that something did not happen which ruffled his temper. On the last occasion of his appearance, on the 16th October, 1793, in the course of his remarks, he made some observation which one of his colleagues thought it necessary to contradict. "Hunter ceased speaking, retired from the table, and, struggling to suppress the tumult of his passion, hurried into an adjoining room, which he had scarcely reached, when, with a deep groan, he fell lifeless into the arms of Dr. Robertson, one of the physicians of the hospital, who chanced to be present." All attempts to restore animation were useless.

The profession of Surgery owes much to Hunter. Not only has he added largely to the stores of medical knowledge, but he raised also the standard of surgical acquirements; and the consequence has been that, since his day, many men of far higher attainments have been induced to seek this as a path to prosperity and fame.

John Hunter's career may be summed up in a few words. A rough untaught lad, he found surgery a mere mechanical art: he left it to posterity a science.

39—Self-instruction: Music. German. F. A. and A. T.—We have already advised a course with reference to German. For instruction in the theory of Music, we should recommend Hamilton's *Catechism*, and the work published by Messrs. Chambers. The *Educational Course* of the latter is well adapted for the self-instruction which our correspondent seeks.

40—Quotation—Latin. H. H.—"Actis ævum implet, non segnibus annis," is a quotation from Ovid, often applied to characters distinguished for a number of brilliant actions accomplished in the course of a short life. It has been loosely translated—

"Not by slow time was mark'd his useful life;
With deeds, not years, his share of time was rife."

41—Romney. J. H.—The cause of Romney's domestic unhappiness appears to have been founded on the following circumstance. Romney had bestowed much time and patience on the attempt to make gold! One evening, after working in the laboratory, he was induced by his wife to attend some of her company at the tea-table. While there, his furnace blew up. The painter was never reconciled to his wife, to whom he attributed his failure.

42—College Expenses, &c. J. B. writes as follows:—"In your notice of 'Oxford Expenses,' given in the Appendix (vol. ii., page 10), you state that the least expensive college for a man of thirty years of age is Pembroke or Exeter. This assertion is not correct with regard to the latter, as I know that the necessary expenses there—by which I mean tuition, room-rent, university dues, and laundress, are little short, on the average, of £50 a year. If, however, your correspondent is thirty years of age, he is at once debarred from entering at Exeter College, as it is a rule with most of the colleges, and with Exeter among the rest, not to admit a man who is more than twenty-one. From my own acquaintance with Oxford, I should recommend a man of thirty to go to Magdalen Hall, because, although I am not acquainted exactly with the expense there, yet I presume it to be moderate, from the fact that there are many of that age, and many of moderate means, who are members of that house. New Inn Hall and St. Mary's Hall are particularly expensive. The other two halls I suppose to be moderate, but I think Magdalen Hall the best in every respect. Worcester and Jesus are moderate colleges, but the latter is almost entirely composed of Welshmen. Baliol is said to be the cheapest of all, but it is impossible to get in there without having one's name down three or four years before, and moreover, even then they will only admit the best of the candidates, i. e., such as are likely to do them credit in the university examinations."—[Our correspondent, we believe, is mistaken as to the fact that Magdalen College is the best under all circumstances. It is true that it is open to what are called "old men," but the expenses are much larger than at Worcester, which is free from the objections urged against Baliol College. The difficulties in obtaining access to the latter are moreover exaggerated.—J. B. L.]

43—Geology. "Dear Sir,—It has for a long time been my wish to commence the study of geology, but from my being unable to obtain the necessary specimens, except at a great expense, I have found considerable difficulty in the matter.

Near where I reside (Ightham, by Sevenoaks, Kent), almost any quantity of fossils of the chalk and green-sand formation can be obtained by a very little trouble; but specimens of earlier rocks are not to be met with. Now, I have no doubt many of your readers who live in Scotland, Wales, &c., have a similar difficulty as regards the latter formations. I have for some time thought of a plan which I think will do much to remove this obstacle to the study of the science; and as you have just commenced a series of lessons on the matter in *The Tutor*, perhaps you will oblige me by giving my plans publicity. I should be very happy to send to any of your readers who may apply to me, such geological curiosities as are within my reach, on condition that they will do me a similar kindness with regard to the rocks found in their neighbourhood. Perhaps some other of your readers would like to make a similar offer to his fellow-students through your pages. It would be as well, however, to understand in the first place that the expense of carriage, &c., must be borne by the person to whom the parcel is sent. I think by this plan being carried out, many of our young friends may get together some very good collections of rocks and fossils at a very trifling expense. It would, perhaps, be better still if some of the more advanced students, in writing to each other respecting the above, would give a short account of the geological phenomena in their locality; or would offer to solve any difficulty that may present themselves to the tyro at the outset of his career. I remember a friend of mine who, in his earlier studies, mistook a hard and very compact rock of the green-sand formation for one of the granite class; and was puzzling himself for some months to account for the fact of granite being found above rocks generally lying near the surface. I mention this to show how necessary it is for geological students to be possessed of the knowledge which would enable them to distinguish between masses of rocks and strata they may meet with in their researches, and this knowledge can be in no way so well obtained as by a careful comparison of specimens.—P. S. I believe it a very general practice amongst some of our most distinguished geologists, thus to make exchanges of the curiosities they may meet with."—T. H.—[This is a capital suggestion, and if carried out with care and earnestness, will be productive of much instruction. We should ourselves like to share in the advantages of this interchange, but unfortunately have neither time nor local opportunity, to enable us to perform our fair share of the task.—Ed.]

44—Latin: Self-instruction. L. C. writes as follows:—"Sir,—I some time since obtained a situation as usher in a boarding school, but I find myself so ignorant that I am almost ashamed to hold it, though the principal seems satisfied. A knowledge of the Latin language would be of infinite service to me; but it is impossible for me to obtain any instruction, as I am situated too far from town, and the principal himself knows little of it. My leisure hours for the last twelve months have been chiefly occupied by its study, but I have made nothing like the progress I expected to do. I have learned by heart, as far as Prosody, the *Eton Latin Grammar*, and have written all the exercises in Henry's *First Latin Book*, and translated Valpy's *Latin Delectus* as well as I could, but many sentences I could make nothing of. I

have just commenced *Cæsar*, but I don't get much on, and am often tempted to give it up. I have neglected it very much of late. Would you have the kindness, either through your valuable periodical (*The Tutor*) or by private letter, to advise me how to proceed; whether you think, by perseverance, I shall be able to master it; also, what books, &c., you would use: I can devote about two hours a day to its study. I am, Sir, &c."

There is no evidence which is more hopeful in such a case than the knowledge of deficiency. The *Elton Grammar* was hardly what we should have recommended, but the study of it cannot have failed to produce useful results. To so diligent a student as L. C., who is so anxious to learn, the Hamiltonian system would afford great facilities. *Cæsar* has been published according to that system, viz., with an interlinear translation in one part, and the text in its original order in the other part of the volume. Let L. C. take that or any other of the Hamiltonian series, and practice in the following manner:—first, read the text aloud, then endeavour to translate it, and write down the translation, compare this with the interlinear translation, and correct it; then under each English word (without referring to the text or the printed translation) write the Latin word, and when this has been done, see that your Latin words are in their right cases, numbers, &c. Should you come to a term for which you cannot remember the original Latin, refer to your dictionary. Rewrite the Latin sentence, and by comparing this again with the original, observe where your copy differs. By a reference to your Grammar you will discover why the words should not be placed in the order in which you have put them. If this plan be earnestly pursued for two hours a day, L. C. will find himself able to read *Cæsar* with satisfaction in a few months. The same system may then be followed with *Cicero*, *Tacitus*, &c. We have mentioned, already, a series of Latin books useful to students under ordinary circumstances. To those who fear trouble, and who still entertain the pleasing delusion that there is a royal road to learning, we cannot give any advice. No knowledge can be obtained without labour; and, as a general rule, diligence is the handmaid of genius. To the determined and persevering student difficulties are stimulants to renewed exertion, which, while they seem to retard, only develop his powers and mature his strength for future struggles.

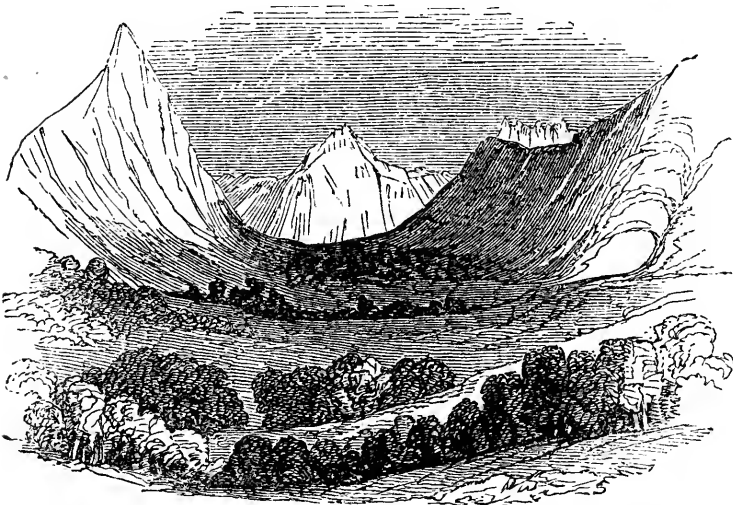
45—Arithmetic.—At App. p. 1, vol. iii. of the *Family Tutor*, it is stated that a correspondent "would be glad to receive suggestions to render his task of class teaching less tedious, and, if possible, less laborious. We believe we shall render L. E. good service by directing him to obtain Stanbury's *Arithmetical Class Tablets*, which will relieve him of much labour, and facilitate the progress of his class." This is the only possible good advice you could give L. E., for there is nothing published, in my mind, that would assist him better, although there is nothing *masterly* in their use. Twelve months ago, a scientific journal, similar in character to your own, was about to be started in Dublin, but owing to the death of the principal, the *idea* of the publication departed also. I was engaged to draw up Mathematical papers of a practical nature, which, I need not say, never appeared; but your correspondent's query above has called them forth from their

musty repository, and which, I find, are the very thing he requires, and are well adapted to school or private instruction. I will therefore venture to copy almost the first leaf that comes to my hand, which you will find to be a *masterly method* of treating the subject, and exceeds any that could be adopted by tablets, books, or any mechanical contrivance, by which a teacher's knowledge of arithmetic is always doubted. This a teacher should above all things avoid. Give a pupil the least idea of his preceptor's inferiority in computation, and he (the master) will be always bored with questions vulgarly called *posers*.—J. I. L.

"At this early stage of our proceedings, let us introduce the rule of Interest. Q. What is the interest of £540 16s. 8d. for 5 years, at 4 per cent. ? Rule.—Multiply the principal by the rate per cent., and divide by 100, which will give the interest for one year, then multiply by the number of years. Recollect the observation made before, which I will here quote:—'That it is no matter in what order we multiply or divide, so as there is nothing to add or subtract.' With the question given we will use the *multipliers* first, that is, multiply by 5, and then by 4, and afterwards divide by 100. Or, which is the same thing, multiply by 20, and divide by 20 and 5 (the factors of 100). This is equivalent to dividing by 5; hence the answer to the question is £540 16s. 8d., divided by 5 = £108 3s. 4d. The intelligent teacher will see at once that if the years, multiplied by the per cent., will = any part of a hundred, which, divided into the principal, the answer will be found; and that he can with the greatest possible ease manufacture questions at pleasure, and solve them at sight. Again, the interest of £540 10s. 10d. for 3 years, at 3 one-third per cent. ? Divide by 10, (the product of years and per cent. divided into 100), and we get £54 1s. 1d. per answer. 2 years at 5 per cent.; 5 years at 2 per cent.; 4 years at 2½ per cent.; 3 one-third years at 3 per cent. &c., all = 10, which is the tenth of 100. Take any number, *say* 6, and divide it into 10, and we get 1 two-thirds; and let one be the years and the other the per cent., and we have another question. In short, we have a method now of giving as many questions as we please, where 10 is to be divided into the principal for the interest. Required the interest of £782 16s. 8d. for 12½ years at 4 per cent., (divide by 2) = £391 8s. 4d., where the product of the principal and interest = 50. We can manufacture as many different questions as we please in a similar way as above, where 2 is the divisor. The teacher can see that he can make any number he likes the divisor, and can manage the principal so that a child, knowing very little arithmetic, can solve the questions. Again, required the interest of £892 12s. 6d. for 25 years at 4 per cent. ? Here the product of years and per cent. = 100, hence the interest is = to the principal. A couple of notes before we enter into another method, and we have done. We see by the above processes that every question can be formed into two, by changing the years into the per cent., and the per cent. to years, a principle that ought to be remembered, as it will be a valuable acquisition hereafter. Secondly, remember that when the years and per cent. multiplied together produce 100, the interest = to the principal, no matter what that amount may be; and if they amounted to *two* hundred, the interest would be *double* of the principal, &c. &c."

POPULAR GEOLOGY.

CHAPTER V.—GRANITE AND THE PRIMARY ROCKS.



MOUNTAINS OF GRANITE AND MICA-SLATE, GLEN SANNOX, ISLE OF ARRAN.

On the Successional Order in which Strata should be described.—We commence our description of the different rocks, unstratified and stratified, at what we may call the base of the geological structure. In proceeding from the surface, or latest formation, down to the granite, we take the course that naturally offers itself to us, as residents on the surface. We have been familiar with this first, and have only delved down from it, as our material wants and our scientific aspirations suggested. We have therefore presented all the geological formations in this order in the Table that we gave in our third chapter. On the other hand, when we come to describe these formations, it is obviously unnatural to begin at what was but the last of a series of operations, all connected with each other in the due order of cause and effect. We will therefore commence with the unstratified or igneous rocks.

Plutonic and Volcanic Rocks.—These are divisible into two great classes, 1. the Granitic, or, as some geologists call them, the Plutonic; and 2, the Volcanic. We shall speak of the latter in a subsequent portion of these papers.

Igneous Rocks not always preceding the Aqueous.—It is important that the student of geology should bear in mind, that although as a broad general rule the igneous preceded the aqueous rocks, it by no means follows that all the igneous rocks are older than all the aqueous ones. The reverse is very often the case. It is highly probable that the same state of things which originally produced granite during the very earliest period of the earth's history, continued still to exist, and to be in operation at limited depths in the earth's crust, long after sedimentary rocks had been deposited. Volcanic formations are still constantly rising under our very eyes, and we need not therefore speak of their comparatively modern date, in many instances.

Granite sometimes formed later than the Rocks that lie above it.—As at once a proof and consequence of the production of granite later than some of the rocks that overlie it, we may instance the many known examples of the upward flow of fluid granite into fissures of the latter, just as in our iron furnaces the melted ore is found to penetrate, as veins, into the centre of the sandstone walls. Sir Charles Lyell, indeed, thinks that granite may be still in process of formation, through the melting of the rocks that lie above it when exposed to the earth's intense interior heat, which thus lessens their amount,

destroys what organic remains may have existed in them, and reduces the whole into a part of the general mass of the interior of the earth. Such speculations show us, among other legitimate deductions, that incalculable as geological eras of time already are made to appear, by what we see in the crust, even that crust itself can give us but a part—possibly a small one—of the whole truth. So that the history of an individual world seems scarcely less wonderful than that of all the bodies of space; where, when one has arrived at last at something like the comprehension of a universe, he finds that, instead of being at the end of his journey, he is scarcely nearer to it than when he set out, for now he discovers a plurality of universes, if we continue to use the term universe in the same sense in which we have previously understood it.

Granite, general description of.—Granite presents itself in many forms—now as stupendous mountain ranges, such as the Alps, the Pyrenees, the Grampians; now as a floor, of an undulating form; now as veins bursting up through the strata above, and ramifying in a thousand different shapes; everywhere presenting in its forms proof of its originally igneous state. In what is called granite districts, that is, where granite appears above the surface, the scenery is of a rugged as well as mountainous character, to which the snow-clad peaks often lend a strangely harmonious combination of the soft and the beautiful with the grand and the desolate.

Structure of Granite.—In itself granite is one of the most beautiful of rocks, both as regards structure, variety of constituents, and colours. It is composed chiefly of mica, felspar, and quartz, in distinct crystals; but it is also found to contain hornblende, garnet, talc, and numerous other minerals. The crystals of the mica and felspar are often of great beauty, while the quartz commonly fills up the interstices between the two. The colours are extremely various. Felspar is found red, grey, yellow, white, green; mica—black, grey, white, brown, or silvery; quartz is generally clear white or grey; hornblende dark green or black.



GRANITE.

The individual grains of the component parts of granite can be clearly distinguished; sometimes they are small, as in the Aberdeen granite. Mica is found in laminæ, some inches across; also in small plates. The felspar in graphic granite forms almost one huge crystallized mass. This latter derives its name from the circumstance, that the minerals in it are occasionally found arranged in a manner that has been likened to the lines of Arabic writing.

The Uses of Granite are chiefly confined to building, and some of the most extraordinary structures of the world have been formed of it; for instance, the Egyptian Pyramids. Its extreme hardness renders it of pre-eminent value for all edifices of a permanent character. The granite used in London for Waterloo Bridge, and for the river wall of the New Houses of Parliament, was brought from Aberdeen, where it forms the ordinary building stone. Of late years the red granite of Peterhead, in Scotland, has been used for vases, chimney pieces, &c.: it is brought by machinery to a high polish. Mica and talc may be occasionally found in single crystals, of a foot or so square, and then become admirably fitted for splitting up into thin transparent plates, that may be used instead of glass. Some believe the Romans used such plates for the garden frames, in which they grew early fruits and flowers. Talc will bear a higher heat than glass without injury; and, when used in ships of war, is rendered less liable to break by the explosion of ordnance. The Chinese use decomposed felspar in the manufacture of their best earthenware; and we ourselves have found it of such value for the same purpose, that many thousand tons are annually brought from Cornwall to the English potteries.

Primary Rocks: Gneiss, and Mica Schist Systems.

Formation of Gneiss and Mica Schist.—As the crust of the earth cooled under the operation of the influences described in Chap. i., it appears to have crystallized into granite. That was the first step in the economy of creation. The next was produced by the combined influences of this gradually lessening heat, and of atmospheric and watery action upon the surface. Hence the strata known under the names of the Gneiss and

Mica Schist systems. These are, unquestionably, the oldest watery deposits known, and have probably preceded the period of the existence of life in any shape. They also extend so largely over the world, as to approach nearer to universal formations than any of later date. Nowhere do we find any trace of their formation in the present time; they seem to be altogether productions of the past. The peculiar circumstances under which they were formed appear to be these:—the internal heat of the earth had cooled down sufficiently to allow of a certain action of water, without the latter passing off into steam, but was yet too hot, and in other respects unsuitable, for the appearance of organized beings.

Popular Rock-Classification.—Let us here pause for a moment to remark, that all the stratified rocks of geology may be presented under one very simple and instructive aspect—that of their essential constituents. Thus—

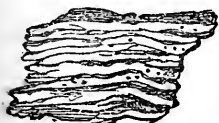
The Siliceous, or flinty series: commencing with granite, and passing through the gneiss and mica schist rocks, the grauwacke, sandstone, and sand.

The Argillaceous, or Clayey series: including gneiss and mica schist; clay slate; slaty shale; laminated clay, and alluvial or common clay.

The Calcareous and Granite: gneiss and mica schist; crystalline marble; limestone chalk, and common marl.

The Carboniferous: commencing with coal, the product of the decay of organic (vegetable) life, and following from this, in order of intensity of effect, not, as in the previous instances, resulting from it, lignite and common peat.

Structure, &c. of the Gneiss and Mica systems.—As might naturally be expected from a consideration of the facts already mentioned, gneiss and mica schist consist essentially of the same substances as granite, but altered in their relative proportions, and having various other minerals added. But the most important distinction between the two classes of rocks is in the structure. Granite, as we have pointed out, is crystallized; each mineral in it forms an individual independent crystal, or at least occupies the space left vacant between crystals. In gneiss and



GNEISS.

mica schist, on the contrary, the very same materials—the felspar, quartz, and gneiss—are rolled, or rounded, or in fragments, evidently the result of watery action. Again; granite presents no appearances of lamination or stratification; whilst gneiss, however hardened or contorted by the rough treatment it has undergone, in the then chaotic condition of the globe, always reveals both these characteristics in its structure. There can be no difficulty, therefore, in saying, the fragments worn down must have been deposited in a sediment, and heat and pressure did the rest. These structural differences are illustrated in our engravings.



MICA SCHIST.

Illustration of the Heat existing during the formation of Gneiss and Mica Schist.—It is interesting to observe how often in Geology some accident reveals important portions of history. The garnet does this for the systems under review; for the fact that it is found in them shows, that the rocks in which it is embedded must have assumed their present condition under a heat powerful enough to form that mineral by fusion, but which could not melt the constituents of the rocks themselves, or they would again have become crystallized, as in the original granite.

Scenery of Granite, Gneiss, and Mica Schist districts.—The engraving at the head of this chapter is a glimpse of the kind of scenery that exists where there is a predominance of granite and gneiss and mica schist rocks on the surface. The granite, generally, is such cases, forms the projecting mountain peaks, and the hard angular precipices; while the gneiss and mica schist occupy the lowlier sites, and the rounder outlined masses; for the latter being softer, lose their angularities sooner than granite. The gneiss or mica schist rocks occur abundantly in our own country, especially in the Scottish highlands and isles. Some of the most picturesque effects of highland scenery, with its deep glens and precipitous mountain and hill sides, are found among them.

Uses of Gneiss, &c.—The uses of the rocks of these systems are not remarkable. The primitive limestones which they include make valuable marbles. Vases are formed

from stea schist, the *lapis ollaris* of antiquity. Flexible asbestos is found among the mica-schists, and is used for the construction of fire-proof fabrics. Of their mineral contents, the garnet is the chief; the finest examples of this stone are dug up from among these rocks. Tin and copper also occur in veins running through them.

Clay Slate (Cambrian and Skiddaw), Grauwacke, and Silurian Systems.

Clay the distinguishing Constituents of these Rocks.—At length we touch upon the boundaries of life, and where that begins the primeval chaos must be nearly at an end. Before we ask ourselves what life it was that thus early ventured forth from the womb of time, let us notice the material changes that prepared the way for it. As flint, or silica, was the characteristic of the gneiss and mica schist systems, so is clay the distinguishing feature of the systems named above. We may also observe that the clayey, or argillaceous rocks of this series, bear the same relation to the flinty gneiss and mica schist, as the clays and the sands upon which we now walk. Fineness of particle seems to be the only essential difference distinguishable between the mineral constitution of many sands to clays. We can therefore readily understand how particles, worn down from the same rocks (of mica schist, for instance), may have been separated, and carried by the waters to different distances, and, ultimately, deposited in altogether distinct beds. And thus, also, is explained the fact that the gneiss and mica schist rocks are seldom found to any extent in the same districts as the clay slates, and that, in consequence, the latter not unfrequently rest on the granite rocks, without any interposition of gneiss and mica schist, as in Cornwall and Cumberland.

Clay-slate.—The distinguishing peculiarities of the clay-slate, grauwacke, and Silurian systems may be thus described:—Clay-slate consists almost entirely of argillaceous compounds. It is found in beds of immense thickness, with a fine grain—sometimes hard and splintery, sometimes soft and easily worn away—glistening aspect, and of various colours—green, black, bluish, mottled, and purple. There is a group of slates and flag-stones near Snowdon, in North Wales, fifteen thousand feet thick.

Grauwacke.—Here the argillaceous compounds are mingled with arenaceous—or sandy—strata, the whole forming an aggregate of clay, quartz grains, or sand, felspar, and mica, with fragments of jasper, and other minerals. The structure is variable. Grauwacke may be found as fine as a coarse slate, and as rough as a mere conglomeration of pebbles.

Silurian.—The limestones which occur partially in the previous systems, now appear much more frequently, so that the argillaceous compounds are here largely blended with calcareous matter. The rocks of the grauwacke and the Silurian systems are not readily distinguishable, except in their native masses. These show that the latter formation contains more frequent alternations of strata, have suffered less alteration from heat, and are generally of a looser texture, suggestive of their higher state of preparation for the beings they were to nourish.

Superficial Characteristics of these Rocks.—As a whole, we may say of these argillaceous stratas generally, that they are widely distributed, and possess strongly marked superficial characteristics. The blue, grey, green, or purple colours, the generally fine grain, the laminated structure—often exhibiting, also, regular symmetrical joints—and, lastly, what is called the quality of cleavage in the clay slate, which enables us to split it up into thin plates, at nearly right angles to the line of stratification, are all features that at once arrest the eye of those who see them for the first time, and cause them to be easily remembered and distinguished afterwards.

Slate Cleavage.—This curious phenomenon, the cleavage, is attributed to heat, which, while sufficient to produce that entirely new form of material structure, was still moderate enough to allow of the development of the new and infinitely greater wonder, organic being; or, supposing it to have taken place at a later time, and under circumstances that caused life in that special locality to be destroyed, the heat was still insufficient to destroy the organic remains which were to tell us their history. To that theme we now address ourselves.

First appearance of Life on the Globe.—As all we know of the animal and vegetable life of the world in remote periods is derived from the petrified remains of certain plants and animals, it is important to consider how far this fossil record is complete. Obviously, it is incomplete. On the one hand, we cannot, for an instant, suppose that specimens of every living thing were deposited in the sediments that ultimately became rocks, and then reduced their organic contents into the same hardened materials as themselves; nor on the other, can it be supposed that we have exhumed anything like a complete set of the specimens that have been thus preserved. But even rocks have been subjected to such heat as would destroy their enclosed fossils. Above all, there are the seas and oceans, of whose bottoms we can know nothing, covering the larger portion of the entire crust of the earth. All these sources of imperfection must be kept in view in examining the geological records of life.

Lowest strata in which Organic Remains have been discovered.—It was long supposed, nor is the idea yet abandoned, that the Silurian was the lowest system in which organic remains had been discovered. The name, Silurian, let us observe by the way, was adopted to indicate the fact, that the beds which compose that system are largely developed in that part of the west of England which was occupied in the Roman period of domination by the Silures. But organic remains have been discovered of late years below the Silurian base in England, and in strata in America, which the geologists of the country believe to be also of earlier formation. It is possible, therefore, that life commenced with the gneiss and mica-schist systems; and the beds of limestone comprised in it are especially noted in connexion with this hypothesis.

The earliest Living Things.—And in what form does this great revelation first present itself? The answer is—the very humblest; in markings produced by fucoids, (a tribe of sea-plants) in the lower Silurian rocks of Russia. Thus, the food of animals preceded, as we might naturally suppose, the animals themselves. Of the latter, the earliest appear to have been the polyparia, already described, the builders of the gigantic coral reefs; the Graptolites, a family allied to the sea-pens of modern oceans, which burrow in the sand and slime of deep water; and the Crinoidea, a kind of star-fish, fixed on the top of a flexible stalk, rising from the sea-bottom, one of the very lowest of animals in its organization, possessing arms to catch its food, and a stomach of one aperture to digest it, and nothing more—eaters for eating's sake, one might be apt to say; but the meaning of its peculiar structure seems to be partially, at least, indicated, when we learn that it belongs to the echinodermata, the police of the seas, who do not simply arrest the troublesome mobs of those lower regions, but devour them, and so keep the way clear. There have been also found in the Silurian formations, examples of the annelida, or sea-worms; of the crustacea, represented by one almost omnipresent animal, the trilobite, an inhabitant of the sea, not unlike our wood-louse; of the mollusks, including, among many less highly organized species, the nautilus and cuttle-fish. All these belong to the inferior of the two great divisions of animal creation—the vertebrated and invertebrated, the first having a back-bone, and the higher nervous system which that structure implies; and the second wanting that structure, and therefore possessing only a lesser degree of nervous development. But a few faint, yet highly important traces, have been discovered in the Silurian system of fishes, the first step in the ascending scale of vertebrated animals. The results, therefore, of all these facts may be summed up thus:—

Dry land existed during these systems, and gave birth to plants, chiefly, if not entirely, in the upper strata. There are no traces of land animals.

The marine animals were probably very few in the older, and grew more numerous in the later parts of the systems.

There is no particular degree of simplicity in the structure of these, the earliest animals; nor within certain limits are they confined to the lowest classes of organized beings. At the same time the lowest vertebrated animals do but just appear in them; and the higher—reptiles, birds, mammalia, are unknown.

REVIEWS OF NEW PUBLICATIONS.

The Elocutionary Manual: The Principles of Articulation and Orthoepy, the Art of Reading and Gesture, illustrated by Tables, Notations, and Diagrams, with Exercises in Expressive Delivery, and a copious Selection of Extracts, emphasized and rhetorically punctuated, embodying the Language of the Passions. By A. M. Bell, F.R.S.S.A. &c., Professor of Elocution and Vocal Physiology, &c. Edinburgh: W. P. Kennedy.

"At no time has the cultivation of oratory been more requisite, or of greater consequence to the highest interests of truth, than it is now." So says the author of the book before us; and startling as the statement is, to those who have been accustomed to believe the days of oratory past, and that henceforward the press would occupy its place, we incline very much to agree with him. For, consider what oratory is: not the discovery of truth, though the orator must start from truth as his basis, but the art of persuading others to believe in the orator's truth, and to act upon their belief in *his* way. Now, whether it be from a defective education, or from other less obvious causes, it is not the less certain that the inculcation of truth by the press does not convince many, who still can be convinced by earnest passionate personal efforts; and of those who are convinced, still fewer are sufficiently moved by the press to do anything in support of their views. But the political events of our day, and of the immediate future, are too stirring and momentous—too universally interesting for them to leave any real powers unused that can be turned to good account in their development. Already we see one man—Kossuth—whose wonderful oratory equals, possibly, all things considered, that of the greatest speakers of antiquity, and who certainly surpasses them in the results. He is rousing the United States from end to end of its enormous territories, and has, evidently, all but persuaded them into the acceptance of his policy—intervention against those who intervene in the domestic affairs of their neighbours; and if they do finally accede

to his views, it is far from unlikely, that in all the succeeding events, which, beginning with the outbreak of the Hungarian and Italian peoples, will probably embrace the whole continent in a struggle with their governments;—it is, we repeat, far from unlikely, that Kossuth himself will be the centre point, around which the incidents of this stupendous tragic drama will group themselves. On this head it is not uninteresting to remark, that oratory and liberty have ever had a deep and intimate connexion with each other; so that when the one languished, the other did the same. Oratory, for instance, rose in Greece with the rise of republican institutions, and only declined when they fell, under the ascending star of Alexander the Great.

Of course, we must carefully distinguish between orators and public speakers. Some of the latter may be excellent men of business, who use speaking simply as a necessary instrument; and some may be mere talkers—fluent babblers, who can get up at any time, under any conceivable circumstances, and pour forth an unintermitting stream of common-place, upon whatever subject you please, and for as long as you please. These men are moral nuisances. If you do not like a book, you can put it by and get another; but you cannot, at a public meeting, put such a man by, and ask a worthier successor to take his place.

If, then, oratory, which has been of such importance, is again destined to resume its old influence, for a time at least, what can we do to develop its advantages to the utmost, and to lessen or remove that which may be of an opposite tendency? We should answer that question in the following manner. Let us not trust to orators alone, but study for ourselves the subjects with which they deal; we may then allow ourselves, once convinced, to be lighted up into generous enthusiasm by the lightning glow of their souls. Let us further learn to distinguish the true from the false orator; that is to say, the man who desires zealously to infuse into us a passionate love of all that is good, and noble, and true, and to accept them unhesitatingly with all their consequences; and the man who desires in his inmost soul only to promote his own selfish worldly interests, or to obtain a name and a power that may redound to his individual aggrandisement, rather than to

the good of his country. It is often necessary to watch a truly able man for a long time, before you can decide to which of these categories he belongs. Never mind: to suspend judgment till the materials for judgment are complete, is one of the indispensable laws for the discovery of truth. And this need not suspend action. A man's conduct in a particular matter may be good, though he be worthless; and a good man, on the contrary, may, especially at the outset of his career or in trying emergencies, make mistakes which advancing years and increased experience will enable him to correct, and to guard against for the future.

But how does all this bear upon the book before us? it may be asked. Do you mean to say, any book can teach us such an art? Certainly not. In the long run the principles of the art must be drawn from the highest practice of the art; just as in poetry, it is the poets who make critics, not the critics who make poets. But when we have had great orators, or great poets, it is certain that the critics of both can show us much of the secrets of their greatness, and so help, first, to develop the minds of new orators and poets; and, secondly, disseminate among those for whom orators speak and poets write, a just appreciation of their respective excellences and defects, and so form a public taste, which finally, itself, acts powerfully on the development of the youthful genius, which is to spring forth from its bosom. Now, if a good book on the art of speaking cannot directly do much in developing high individual talent, which must necessarily be, to a great extent, original both in its studies and in the fruits of study, it can do much to create the public taste we have spoken of, by teaching great numbers of persons who are—or, at some future time may be—engaged in any kind of public speaking, what are the material elements of which successful oratory is composed. We believe we may venture to say the book before us is capable of accomplishing this. Let us briefly review its chief heads:—*Definition of Speech, Principles of Respiration, Respiratory Exercises, Principles of Vocalization* (this latter word refers to the voice, not to singing, as some might suppose), *Principles of Vowel Formation, Anglicisms, Scotticisms, Notation generally, Articulations, Alphabetic Defects,*

Inflexions, Accent, Exercises on the Mechanical Grouping of Words, Analysis of Sentences, Pauses, Modulation, Force and Time, Emotive and other Expressions, Looks and Gestures, &c. &c.; the whole interspersed with exercises, duly notated, for the correct fulfilment of all the various rules. Finally, there is a large selection of elocutionary passages, containing also various guiding memoranda. The following passage affords a fair example of the writer's style, and conveys a most important practical truth.

"PRINCIPLES OF RESPIRATION.

"10. Speech consists of variously modified emissions of breath. Breath is thus the material of speech. It follows that the lungs must be well supplied with air before speech is commenced, and that they must be kept so supplied during the whole progress of speech. The very common fault of dropping the voice feebly at the end of a sentence, arises in great measure from a faulty habit of respiration: and many personal inconveniences, sometimes painful and serious, accrue to the speaker from insufficient or too infrequent respiration.

"11. The inspirations in public speaking must be full and deep, expanding the whole framework of the chest; and they must be noiseless. Audible suction of air is as unnecessary as it is ungraceful. To avoid it, let the passage to the lungs be brt open, and expand the chest, and the pressure of the atmosphere will inflate the lungs to the full extent of the cavity created within the thorax.

"12. The common Scotch bagpipe gives an excellent and most convincing illustration of the comparative efficacy of a partial, and of a complete inflation of the lungs. See the piper, when the bag is only half-filled, tuning the long drones! how his arm jerks on the wind bag!—and hear the harsh and uneven notes that come jolting out from the pressure! Then see him, when the sheep-skin is firmly swelled beneath his arm!—how gently his elbow works upon it! while the clear notes ring out with ear-splitting emphasis. Let the public speaker learn hence an important lesson. He but plays upon an instrument—one, too, like the bagpipe in construction. Let him learn to use it rationally—in consciousness, at least, of the mechanical principles of his apparatus. For, as the instrument of speech is more perfect than anything the hand of man has fashioned, it surely must, when properly handled, be 'easier to be played on than a pipe!'

"13. There is an important point of difference, however, between the human speaking machine and the bagpipe, which renders the management of the air-reservoir somewhat different in the two cases. We have but one channel of communication with the lungs—the glottis:* through this

"* The GLOTTIS is the narrow aperture of the trachea or wind-pipe, situated behind the root of the tongue. Its action in closing or opening the passage to the lungs may be felt in coughing. The effort that precedes the cough shuts the glottis, by contact of its edges; and the explosive ejection of breath in the cough arises from the sudden opening of the glottis by the separation of its edges.

narrow aperture all the breath must pass both in inhalation and exhalation. The bagpipe, and other wind instruments, such as the organ, have *separate entrance and exit pipes* for the air. In these, therefore, the air may be both drawn in and expelled *simultaneously*; while in speech, the acts of inspiration and expiration must be alternate, and cannot possibly take place at the same time.

"14. The speaker should take advantage of every cessation of the outward stream of air to replenish the lungs. He must not exhaust his stock before he takes a further supply, but he must aim at keeping up a constant sufficiency, by repeated inhalations. This is the *principle* which the bagpipe teaches. The slightest pause will be found long enough to give opportunity for adding to the contents of the chest, easily and imperceptibly.

"15. In addition to the power and ease that are gained by this principle of managing the respiration, it will secure to the speaker the farther advantage of a *good carriage of the bust*; and it will also, in no slight degree, contribute to give the young orator a feeling of *confidence* in addressing a large audience. Fear naturally collapses, and courage expands the chest; and the cultivation of the habit of keeping the chest expanded in speech will impart courage, and prevent that perturbation of the breathing which bashfulness and diffidence often occasion the unpractised speaker."

In another passage Mr. Bell gives us a familiar, and rather felicitous, illustration of the formation of that which we call

VOICE.

"The principle on which vocal sound is formed, is the same as that by which a blade of grass or a slip of ribbon is made to produce a sound by being placed between the lips while the breath is strongly impinged against them. But the most perfect imitation of voice, as well as the most exact imitation of the laryngeal aperture, —the glottis— is obtained by the approximation of two fingers, say the fore and middle fingers of the left hand, holding them nearly to the upper joints in the right hand, and forcing the breath between their moistened edges. The aperture thus obtained between the fingers, from the knuckles to the upper joints, is of about the same size as that of the glottis: and the sound produced by the vibration of its edges remarkably resembles glottal voice. It may, besides, be so modified as to exemplify many of the vocal principles. Comparative *openness* of the aperture produces *grave* sounds, and *contraction*, *acute* sounds: *slackness* of its edges causes *huskiness* or *whisper*, and *tension*, *clearness* and *purity* of tone. A knowledge of these principles should enable the speaker to correct any habits of defective sonorousness he may have acquired."

We should have been glad to have found some acknowledgment in Mr. Bell's pages of an American book, to which we cannot but think he has been largely indebted—Dr. Rush's *Physiology of the Voice*, which was the first work of any value that attempted to reduce to scientific principles, and regular formulæ, the subtle, intricate,

and varying phenomena that the subject included. Not that the present is at all an imitation of Dr. Rush's publication; but we think it would hardly have been so good as it is, had it not enjoyed the benefit of such a predecessor.

Perhaps the most original part of the *Elocutionary Manual* is that included under the words "Looks and Gestures," which are elaborately dealt with, and illustrated by various ingenious diagrams. The author even gives a system of notation, expressly for teaching the pupils their proper expression. He considers this notation has various uses. The speaker can register for practice any position or movement which, in practical oratory, in painting, or in sculpture, strikes him as effective. The artist, also, can thus reproduce any attitude he has once seen. The teacher of gesture obtains in it a nomenclature for the mechanics of action. The student, of course, uses it to obtain grace of gesture and accuracy of bodily expression. The value of such a notation must very much depend upon the power of the author to apply it correctly. Manifestly, if he does not understand the natural expression of the passions themselves, we need not trouble ourselves as to his mode of recording that expression. Our readers may judge for themselves, as to his fitness for this task, by a perusal of his lesson on the

ORATORICAL USE OF THE HANDS.

"The HANDS are open and relaxed in *graceful calmness*, they are *locked* or *clapsed* in *emotion*, they are *wrung* in *anguish*, they are *rigid* or *clenched* in *passion*; they are *raised* or *applied* in *supplication*, they *descend* slowly in *blessing*,—with *quick vehemence* in *malediction* and *threatening*; they are *moved towards* the body in *invitation*, they are *pushed from* the body in *rejection* or *dismissal*; the *palms* are *turned upwards* in *candour* and *sincerity*, *downwards* in *concealment* and *cunning*; they are *turned outwards* from the body in *defence*, in *apprehension*, or in *aversion*; they are *turned inwards* towards the body in *boldness* and *confidence*; they *start* in *astonishment*; they *wave* or *clap* in *joy* and *approbation*. The *hand on the forehead* indicates *pain*, *confusion*, or *mental distress*; on the *crown of the head*, *giddiness* or *delirium*; on the *side of the head*, *stupid*; on the *eyes*, *shame* and *grief*. BOTH HANDS, *similarly applied*, *intensely heighten* the expression. The *hand supporting the cheek* expresses *langour* or *ennui*; *supporting the chin*, *meditation*; the *hand laid on the breast* appeals to *conscience*, or indicates *desire*; the *hands crossed* on the breast express *meekness*; the *hand pressed* on the upper part of the chest, or *beating it*, expresses *remorse*, or *acute bodily distress*, *difficulty of breathing*, *palpitation of the heart*, &c.; on the lower part, it

indicates boldness, or pride; the back of one hand laid in the palm of the other expresses determination and obduracy; the hands crossed palm to palm express resignation."

Lebahn's German in One Volume. Simpkin, Marshall & Co.

THE words "fourth edition" on the title of this book, show that M. Lebahn's labours to make his language known in this country have been duly appreciated. It is, in truth, a noble language, and has been admirably used during the last century, by those who write and speak it. It is impossible to convey readily any notion of the extent to which our own literature has been influenced by that of Germany in recent times. This is a pleasant fact to dwell upon, when we recollect how large a portion of the blood in our veins comes from a German ancestry. But the English language itself reminds us incessantly of the old connexion. "*Five-sixths of all English words are of German origin,*" says M. Lebahn, who uses the fact to show how erroneous is the generally prevalent idea of the difficulty of learning German. The pronunciation is also, we are informed, exceedingly simple; while the differences of construction between English and German may be brought under a few easily acquired rules.

M. Lebahn gives us, in his *German in one Volume*, a practical Grammar, with exercises to every rule, the exquisitely beautiful tale of *Undine* (in German), with explanatory notes on all difficult words and phrases, a vocabulary of 4,500 words synonymous in English and German; and lastly, a key to the exercises. Numerous interlinear translations occur, the German letters of handwriting are shown, as well as those for type (the old black letter), and in various other ways, the use of the words "*practical*" grammar, is fully justified. M. Lebahn considers a careful, assiduous student might so far master the language in four months, as to be able to understand it and speak it with some degree of fluency. We may say, in conclusion, we quite agree with his remarks on

LEARNING A LANGUAGE IN ITS OWN COUNTRY.

"Experience testifies that a language may be acquired without oral instruction through the aid of a teacher, though intercourse with *well educated* natives greatly facilitates the study; and I think the opinion altogether fallacious, that it is necessary to reside for years in Germany, to acquire a knowledge of its language. Going into a foreign

country, without any knowledge of its language, to learn it there, has never been recommended by those who have tried it. And, again, those travellers, of whom Bacon says, 'He that travelleth into a country before he hath some entrance into the language, goeth to school, and not to travel,' generally feel themselves ill at ease in Germany; they cannot expect to derive either much pleasure or information from their tour."

Young's Introductions to Mensuration and Algebra. London: Simms & M'Intyre.

THESE books are intended for schools and private students. In the one on Mensuration, the author explains the mensuration of plane rectilinear figures, the principles of logarithms and plane trigonometry, the areas, &c., of regular polygons in circles, the construction of geometrical problems, the mensuration of solids, conic sections, and the solids generated from them; and, lastly, the application of Mensuration to practical matters of all kinds, such as the work of carpenters, joiners, bricklayers, slaters, tilers, plasterers, painters, paviors, glaziers and plumbers; also railway cuttings and embankments, guaging of casks, &c.

In the introduction to Algebra, Professor Young describes in the same systematic manner, the leading truths of this important science. Of course, neither of the volumes offer matter suitable for quotation, we shall therefore merely say upon them, that they display the *thorough* spirit of an earnest and able teacher, and appear to be worthy of the reputation of the former Professor of Mathematics at the Royal Academical Institution, Belfast.

Let us add, in conclusion, that the derivation of the word algebra suggests an interesting fact relating to the thing—its introduction to Europe through the Arabians, in the beginning of the thirteenth century. Algebra is a contraction of *Al jebr e al mokabalah*, an Arabic phrase, signifying restoration and reduction. The Arabian algebraists confessedly derived their knowledge from the Hindoos. Whether the Hindoos borrowed it from the Greeks, who were in possession of a treatise by Diophantus, who lived between the second and the fourth centuries, or whether Diophantus derived his materials from them, is unknown; if the latter be the case, the Hindoos must have considerably improved their algebra since, for it is altogether of a higher cast than that of the Greek treatise above mentioned.

ZOOLOGY.—No. XVII.

CLASS—CRUSTACEA.

CRABS, LOBSTERS, ETC.

“By paved fountain, or by rushy brook,
Or on the beachèd margin of the sea.”

SHAKSPERE.

THE essential characteristics of the Crustacea, are the combination of gills or branchiæ for respiration, with jointed limbs and distinct sexes. The name is derived from the external covering, which is less solid than that of testaceous mollusks generally, but harder and firmer than the skin of naked mollusks. It is, in fact, perfectly capable of rendering to the animal all that it requires, namely—protection from the violent concussions to which it is subject among the rocks which are its dwelling-place, and from the attacks of enemies—and a point of support for the limbs in their efforts at locomotion. In the crab and lobster the integument is harder than in many of the smaller species, through the addition of earthy particles of carbonate and phosphate of lime. The colours of the shell are owing to a pigmentary matter of a peculiar nature. This changes to red in a great number of species when subjected to alcohol, ether, acids, or to boiling water; the last being the process to which the eatable Crustacea are, as is well known, exposed. The skeleton, or framework of the integument, is composed of a series of rings, the original number of which appears, from the segments of the animal's body, to be twenty-one. The head, the thorax, and the abdomen generally, comprise each seven of these rings. The skeleton as a whole is broadly divided into two parts—the anterior or carapace, a sort of buckler covering the head and thorax; and the posterior, including the abdomen.

One of the first things that strikes us in looking at a fully formed, hard integument of this kind, is the impossibility of the animal's growing in such a case of mail. How does nature meet this difficulty? Why, by moulting! The canary does not more regularly cast its feathers, than the Crustacea rid themselves of their house or stronghold. The frequency with which this is done, is truly surprising. A

young daphnia has been observed to cast its shell eight times in the space of seventeen days. We may take the craw-fish as an example of the mode. This animal about the end of summer ceases to eat, shows signs of sickness, and presently the carapace becomes loosened from the corium, or part to which it was attached. At the same time a secretion is poured forth, which is at first soft, like a membrane, but gradually hardens into a shell. When the new house is complete, the old one, of course, becomes little better than a nuisance, and must be got rid of. So the uneasy animal begins to rub its legs against one another, then to turn on its back, and shake itself, then swell until it rends the membrane which still connects the old carapace with the abdomen. But this is hard work, and somewhat painful also, no doubt. So, the craw-fish rests awhile. But again its labours must recommence; the carapace must be thrown off—head, eyes, and antennæ must all be freed; and when these things are accomplished, there remains the most difficult part of the task—the extraction of the extremities. This is aided by the splitting of the integument the whole way along, from end to end; but, after all, the poor animal is obliged not unfrequently to leave a limb or two behind. Sometimes, indeed, it cannot extricate itself, and perishes. The abdomen is the last portion freed. And so, generally, in about half-an-hour is the moulting accomplished. Very tender is the new integument at first, and very timid, consequently, its owner. A gentleman who watched a moulting take place, says, after observing that the cast shell presented his *protégé's* perfect counterpart, “instead of his usual boldness he exhibited the most remarkable timidity, which continued for three or four days. He was at first quite soft, and appeared considerably larger than usual, he gradually grew firmer, and on the fifth day felt to the touch as hard as usual, and advanced with open pincers to the attack of my finger, though evidently not without some little doubtfulness of his powers. Before the end of the week he was himself again, came on more boldly than ever, and with greater effect, as his weapons were sharper.”

It may seem a somewhat alarming feature of the moulting, this liability to lose a limb or two in the doing it. But

the animal evidently has no very high notions of the value of any particular one or two of these appendages, for it will throw them off when sudden injury or offence happens to them, almost as heedlessly as we should throw off a glove that had been accidentally contaminated. The land-crabs that used to be found in the garden of the Zoological Society, presented a laughable example of this levity in the treatment of one's limbs. If any of these were taken up by the smaller legs, in a manner which incommoded them, they cut the connexion at once, and ran off upon the remaining members, apparently as contented as before. The meaning of all this is, that the cunning animal knows it can reproduce any reasonable number of legs at will. All it has to mind is, that the division takes place at a proper point, near the basis of the limb, which then speedily heals over, and presently puts forth a new claw, at first small, but which grows gradually to the proper size. If the division does not take place at a right point, bleeding goes on, and would prove fatal, but the animal then, by a great effort, (apparently a violent muscular contraction), shakes off the part that remains beyond the spot where the division should have taken place.

The forms of the Crustacea are strange and fantastic, and the uses to which portions of the frame are put still more extraordinary. We find legs officiating not only in the capacity of locomotive support, but as jaws wherewith to masticate food, or as gills to promote the business of breathing. Some have the carapace greatly developed, as in the walking Crustacea; while others, of which the swimming Crustacea may be taken as examples, have the abdomen of large (relative) dimensions. In fact, this part is the principal agent of locomotion in the water. When the animal wishes to progress, it is by bending the abdomen suddenly downwards under the sternum that it strikes the water, and, consequently, by darting backward, that the animal makes its way through the liquid.

It is necessary here that we should briefly classify the numerous species comprised within the great Crustacean family. The chief division is suggested by the fact that some have jaws for masticating food, while others have merely a kind of beak, or

tubular apparatus, through which they draw their food by suction; and there is yet a third class, whose mouth is surrounded by legs, the bases of which are used as jaws. All Crustacea are therefore divided into the Maxilloso, or masticating; the Edentata, or Hausstellata, the suctorial; and the Xiphosura, or the sword-tailed. The masticating and the suctorial, again, are each divided into various great sections, with further subdivisions into orders and species.

The most interesting feature of the masticating Crustacea is the jaw-foot, represented in the following cut:—

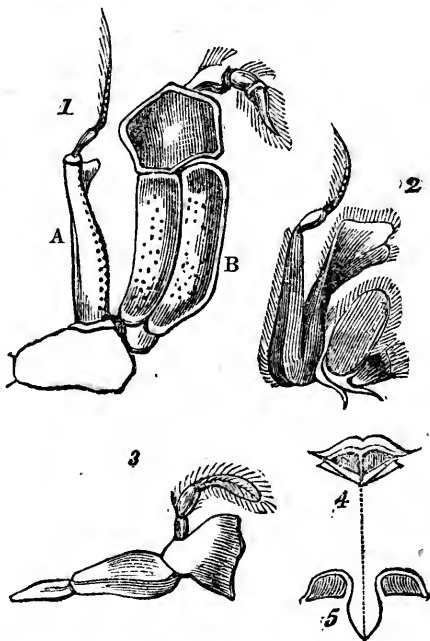


Fig. 59.—JAW-FEET OF *THELPUSA FLUVIATILIS*.*

In the sucking Crustacea, which are parasites, and feed on other animals, we have, instead of the jaw-feet, a tube, or proboscis, containing within, a pair of animal-lancets. These make the wound through which the juices are afterwards drawn. The food, thus prepared, passes through a short, tongueless mouth into the cesophagus, thence into the stomach, where we find an extraordinary apparatus for

* 1. Right external jaw-foot; A, its internal blade; a, b, c, d, e, f, its various articulations; B, its external blade, or palp. 2. Jaw of the third pair, with its palp. 3. Mandible, with its palp. 4. Upper lip. 5. Lower lip, sometimes called the tongue.

tearing and grinding the food, consisting of tubercles, or teeth. The liver is largely developed in many Crustacea, especially in the decapods, or ten-footed, as every epicure in shell-fish well knows, for in this order are included lobsters, crabs, and shrimps. The blood is either colourless, or of a slightly bluish tinge, and is circulated, it is believed, in a similar manner to that of the mollusks. The heart is single, and of various forms—square, cylindrical, &c. The appearances presented by the heart in some Crustacea have been likened to the effect produced by the superposition of a number of stars, the rays of which do not correspond.

The respiratory process in the Crustacea is a very interesting and very complex subject. Generally, breathing takes place through the branchiæ, or gills—an organ familiar to all eaters of the crab, in the form of a number of leaf-like processes, arranged in two groups, the points coming nearly together. In some Crustacea, no special respiratory apparatus can be discovered, and oxygen is then supposed to be drawn directly through the external integument. In others, the gills float in the water, like so many feathery tufts. The Phyllopoda, or *gill-footed*, are distinguished by an extension of their legs, in order to make the latter subservient to respiration—a fact which explains the movement sometimes seen in the feet of such animals, when all the rest of the body is quiescent. The land-crabs possess special contrivances for the moisture requisite to enable the gills to perform their functions. For the same reason, these animals never go far away

illustrate the foregoing remarks by the following engraving, showing the circulatory and respiratory system of the lobster.

There is no brain, strictly speaking, in Crustacea, but there is a tendency towards its formation visible in the centralisation of the nervous functions in the anterior part of the ganglionic chain. The place of the brain in the higher animals is occupied, in Crustacea, by the ganglions, which possess individually the faculty of receiving sensations and determining motion, and which act through the nervous cords.

The eyes of Crustacea exhibit a great variety of structure. In certain classes we find smooth, or simple eyes, two or three in number, formed by a mere modification of the tegumentary membrane, with a mass of gelatine behind it, acting as the vitreous humour, and which is in connexion with the optic nerve. The king-crab is an example. These simple eyes, or *stemmata*, are always immovable, and *sessile*, or sitting. Other classes have what are called intermediate eyes, in which the cornea is still undivided externally, but has behind a number of simple eyes, or lenses, each with its own vitreous humour, and its own connexion with the optic nerve. Lastly, (and this refers to the great majority of Crustacea,) we have compound eyes, presenting a number of facets, each with its own ocular compartment behind. These facets are square in the common craw-fish, hexagonal in the crab, and so on. There is a remarkable fossil species, in which there are four hundred of these facets, the whole so exquisitely arranged for mutual aid, that where the range of one ceases, that of the next begins. There are generally two of these compound eyes, although sometimes they are so closely united as to appear but as one. Sometimes the compound eyes are movable, and sometimes they are supported on a pedicle, or stalk, moved by special muscles. In the Maia, a fringe of hairs may be seen on the inner side of the eye's orbit, obviously answering the purpose of a brush to cleanse the visual organ.

Crustacea can also hear, smell, taste, and receive sensations from touch, as well as perform all the more important processes already described. The auditory organ is essentially a cavity, full of fluid, and possessing a nerve capable of perceiving the

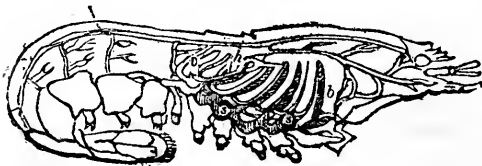


Fig. 60.*

from damp situations. With them, the activity of the breathing organs is so great that they cannot draw the requisite supply of oxygen from water, and consequently they die, if long immersed. We may fitly

* *h*, Heart; *s*, Sinus, or dilated vein, receiving the blood which comes from different parts of the body, and is thence sent to the branchiæ, *b*, from whence it returns to the heart by the branchial veins, *v*.

impulses of sound, and which is further aided by such organs as elastic membranes, and rigid stems, which receive and propagate sonorous vibrations. The antennæ of the second pair, which forms a stem of this kind, assists the hearing of Crustacea. The experiments of M. Savart showed that certain vibrations, too delicate to be perceived without such a conductor, were then readily appreciable.

The bait in our fishermen's lobster pots shows that Crustacea can smell well enough, and act promptly upon the evidence of their olfactory nerves, when it so pleases them. The antennæ are supposed to have something to do with this function also, but the matter is unsettled.

We have already said, the mouths of Crustacea are tongueless, but we must not conclude that they are also tasteless. What the smell can guide them to, we may rest assured their palates can enable them to enjoy. They *select* their food, like everybody else—men or Crustaceans.

The nature of the external integument, as we have described it, does not suggest ideas of delicacy of touch, or, indeed, of any sense of touch at all, short of what a stroke with a sledge hammer might be supposed to convey. But look at those long, slender, quivering, beautiful filaments, that project from the heads of some of the class—the antennæ, and you will no longer wonder at any amount of sensibility the Crustaceans may possess, if you are told the antennæ are its organs of touch. And so they seem to be, though the fact is not quite a settled one among zoologists.

Like every other part of their economy, the arrangements for the perpetuation of the species in Crustacea are full of phenomena of the highest interest. Here we can but touch on one or two of the more salient points. They are all produced from fertilised ova. In the majority of cases, the animals do not leave the eggs until their chief organs are all developed, and their form is nearly that of the parent. But there are many Crustaceans, especially those of a lower class, which are born, as it were, prematurely, and have, consequently, to pass through certain metamorphoses. In Paterson's excellent *Zoology for Schools*, (to which we may once for all express our obligation for portions of the material of this and subsequent papers,) we find an amusing

passage upon this subject. In a Dutch work, published in 1778, there appeared the figure of a small Crustaceous animal (Fig. 61) unlike any previously known. A French

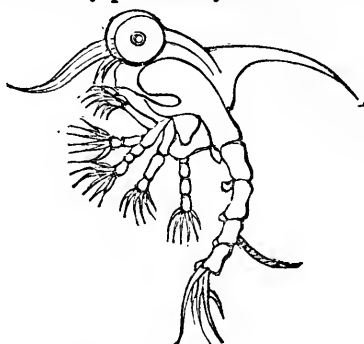


Fig. 61.—ZOA MAGNIFIED.

naturalist took another in the Atlantic, five or six hundred leagues from the coast of France, and included both under the generic name of *Zoa*. A third was taken in the course of Captain Tuckey's voyage to the Congo; and two were observed by Mr. J. V. Thompson, when returning, in 1816, from the Mauritius. All the five specimens were those of distinct species, and constituted the only examples known of such Crustacea until the spring of 1822. In that year Mr. J. V. Thompson, to his great surprise, met with *Zoas* in considerable abundance in the Cove of Cork. Further research showed that these animals, which had been regarded as so rare that the capture of each was recorded as an event, were to be found in vast profusion in our bays and estuaries; and instead of being perfect and anomalous creatures, were but the immature state of the common crabs! These metamorphoses are shown by the great historian of the Crustacea, Mr. Milne Edwards, to depend upon—first, the normal work of development; second, the unequal growth of different parts of the body; third, the wasting away and complete disappearance of certain parts.

We must not forget to say a few words on the reproduction of the little *Daphnia pulex*, or arborescent water flea, so called from its peculiar movements, and its branching antennæ. Before the time comes when the parent must die, under the advancing rigours of winter, and while the animal continues to moult as usual, it casts off, upon one of these occasions, with the shell, two eggs enclosed in a case. The little

package, thus committed to the deep, floats in perfect safety, and from it, in the ensuing summer, a fresh offspring arises, to preserve the Daphnian line of succession.

The fecundity of some of the Crustacea is amazing. A zoologist once watched with great care the whole process of hatching in the case of a fresh-water species, the *Cyclops quadricornis*. The mother carries a little parcel of the eggs on each side of her. He found she laid not less than forty eggs each time, and not less than eight times within three months. From her and her offspring, in short, it was calculated that between four and five thousands of millions of living individuals would issue in the space of a single year.

BENEFITS OF SCIENCE.—The practical view of agriculture cannot be more clearly or profoundly conceived than it was by the North American chief, whose speech on the subject is reported by Crèvecoeur. The chief, in recommending agriculture to his tribe, the Mississeean Indians, said: "Do you not see that the whites live on corn, but we on flesh? that the flesh requires more than thirty moons to grow, and it is often scarce? that every one of the wonderful seeds which they scatter on the soil returns them more than an hundred fold? that the flesh has four legs to run away, and we only two to catch it? that the seeds remain and grow where the white man sows them? that the winter, which for us is the season of laborious hunts, is to them a time of rest? It is for these reasons that they have so many children, and live longer than we do. I say, then, to every one who hears me, before the trees above our huts shall have died of age, before the maples of the valley cease to yield us sugar, the race of the sowers of corn will have extirpated the race of flesh-eaters, unless the hunters resolve also to sow." In his difficult and laborious life of the chase, the Indian consumes in his limbs a large sum of force, but the effect produced is very trifling, and bears no proportions to the expense. Cultivation is the economy of force. Science teaches us the simplest means of obtaining the greatest effect with the smallest expenditure of power, and with given means to produce a maximum of force.—*Liebig*.

EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE FIFTEENTH.

JERUSALEM, ITS HISTORY AND ANTIQUITY—
HOLY SEPULCHRE, THE COURT—THE JERUSALEM OF SCRIPTURE, NOT THE JERUSALEM OF THE PRESENT DAY—PLAN OF THE HOLY SEPULCHRE—ENTRY INTO THE SEPULCHRE—THE STONE OF UNCTION.

"Lord! thou didst love Jerusalem—

Once she was all thy own;

Her love thy fairest heritage,

Her power thy glory's throne.

Till evil came, and blighted

Thy long-loved olive-tree;

And Salem's shrines were lighted

For other gods than thee."—MOORE.

"Where towers are crush'd, and unforbidden
weeds

O'er mutilated arches shed their seeds;
And Temples, doom'd to milder change, unfold
A new magnificence that vies with old."

WORDSWORTH.

"THE city of Judah;"* "the perfection of beauty, the joy of the whole earth,"† "great among the nations, and princess among the provinces,"‡ has sometimes been called Salem, Jebus, Solima, and Capitolina. The Turks have called it *Curumobarech* and *Leucost*; and the Arabs speak of it as *El-Kuds*, which means "holiness." The ancient Greek and Latin writers called it *Hierosolyma*.

Those who would learn somewhat of its earliest history, and other interesting particulars, should consult the works of Josephus, Maundrell, Pococke, Drs. Clarke and Richardson, Chateaubriand, Ali Bey, and others; and as few of my readers will be disposed to doubt the antiquity of the site of Jerusalem, I will merely survey the arguments in favour of its age, and recount some of the most important epochs in its history.

"The city of David" has undergone many changes. It is said to have been built by Melchizedeck, who is mentioned in Genesis (chap. xiv. 18), as king of Salem; but modern commentators have rejected this opinion, on account of the statement of Jerome, who says that he saw the ruins of Melchizedeck's palace, near to Scythopolis (Bethshean). There cannot be any doubt

* 2 Chron. xxv. 28.

† Lam. ii. 15.

‡ Lam. i. 1.

that Jerusalem existed B.C. 1451, because it is stated,* that Adoni-zedec was king of Jerusalem. We find that, B.C. 1444, "Jebusi," which is "Jerusalem," was given, with thirteen other cities and their villages, to the children of Benjamin,† as their inheritance; in 1425 the children of Judah fought against Jerusalem, took it, and set the city on fire;‡ in 1408, David took Zion from the Jebusites, and dwelt in the fort, and called Jerusalem the city of David;§ in 1402, David brought the ark from Kirjath-jearim upon a new cart to Jerusalem, with sacrifices and dancing.|| In 1004, Solomon blessed the people, and consecrated the temple, with a solemn prayer from the brasen scaffold.¶ In 971, "Shishak, king of Egypt, came up against Jerusalem, and took away the treasures of the house of the Lord, and the treasures of the king's house; he took all; he carried away also the shields of gold which Solomon had made."*** In 826, Jehoash "came to Jerusalem, and brake down the wall of Jerusalem, from the gate of Ephraim unto the corner gate, four hundred cubits, and he took all the gold and silver, and all the vessels that were found in the house of the Lord, and all the treasures of the king's house, and hostages, and returned to Samaria."†† In 742, the city was besieged by Rezin, king of Syria, and Pekah, son of Remaliah, king of Israel, but they could not take it.‡‡ In 710, Sennacherib invaded Judah, and took all the fenced cities, but retired when Hezekiah had given him three hundred talents of silver (£166,077 10s.), and thirty talents of gold (£12,273 7s. 6d.).§§ In 610, Pharaoh-nechoh, king of Egypt, went against Jerusalem, slew Josiah, imprisoned Jehohahaz, and made Jehoiakin king in his stead; besides doing this, he put the land to a tribute of an hundred talents of silver and a talent of gold.|||| In 599, Nebuchadnezzar, king of Babylon, besieged Jerusalem, and carried away all the princes, riches, and workmen to Babylon, and destroyed all the vessels of gold which

Solomon had made in the temple.* In 588 Nebuchadnezzar and all his host besieged Jerusalem, and built forts against it round about, and took the city, burnt it, and broke down the walls, besides carrying away a great number of the inhabitants into captivity.† In 536 Cyrus, king of Persia, ordered the temple to be rebuilt.‡ In 445, Nehemiah, having secretly viewed the walls of Jerusalem, which were broken down, and incited the Jews to build them up again, is mocked and threatened by Sanballat, the Horonite.§ In 324, Ptolemy, king of Egypt, captured it; in 168, it was plundered by Appollonius; restored by the Maccabees in 163 B.C.; and 63, taken by Pompey.

In the year of our Lord 70, the city was besieged, taken, and destroyed by Titus; rebuilt in 131 by the Roman emperor Adrian, who afterwards destroyed many parts of the city, and erected temples to heathen deities. In 135 the Jews were finally dispersed, after having failed in a revolt against the Romans, and the city became a Roman colony. In 326, Constantine and Helena built many churches throughout Judæa, especially in Jerusalem, and did much to restore the city, besides allowing the Jews to enter it once a year. In 613, the city was taken by Chosrau, king of the Persians, who slew 90,000. The city was retaken from the Persians in 627, by the Greeks under Heraclius. In 636 Khalif Omar took the city after a siege of four months, and the mosque of Omar was commenced. In 868 the city was taken by Ahmed of Egypt from the Khalifs of Bagdad. In 1073 the Turks gained possession of the city, and the persecution of the Christian pilgrims was permitted. In 1098 the Egyptian Khalifs again obtained possession of the city. In 1099 the Crusaders, under Godfrey de Bouillon, took the city, and elected their leader king. In 1188 Salah-ed-deen took it from the Crusaders; in 1229 it was given up to the Christians. In 1239 the Emir David of Kerek obtained possession of the city, which was restored to the Latin princes by Salah Ismaeel, Emir of Damascus, in 1242. In 1244 the Kharismian hordes stormed it; in 1291 it came into

* Josh. x. 1. ¶ 2 Chron. vi. 7—42.

† Jos. xviii. 28. ** 2 Chron. xii. 9.

‡ Judges i. 8. †† 2 Kings xiv. 13, 14.

§ 2 Sam. v. 6—9. ‡‡ 2 Kings xvi. 5.

|| 2 Sam. vi. 3—14. §§ 2 Kings xviii. 14.

|||| 2 Kings xxiii. 29—31.

* 2 Kings xxiv. 10—16.

† Jeremiah xxxix. 1—10.

‡ Ezra i. 2, 3.

§ Nehemiah iv. 1, 2.



the possession of the sultans of Egypt. In 1517 Selim, the Turkish sultan, reduced Egypt and Syria, including Jerusalem, and his son Soliman built the present walls in the year 1542; and in 1832, when Syria became subject to Mohammed Ali, Jerusalem fell into his hands. In 1834, an insurrection took place, and the city was held by the insurgents for a short time; but Ibrahim Pasha soon quelled the riot, and restored order within its ancient walls.

Such is the history of this city, which has undergone many vicissitudes, and having been the bone of contention for ages, is now almost

"A vanished name;
Its tribes—earth's warning, scoff, and shame."

Our first visit was to the Church of the

Holy Sepulchre, and never shall I forget the scene that presented itself on our approach. The whole area (A) was crammed with groups of beings from nearly every clime, and, certainly, clothed with nearly every costume—some selling beads, crucifixes, amulets, cups, bowls, &c., made from the bitumen of the Dead Sea, the olive-wood from the Garden of Gethsemane, or other relics; amongst which, I noticed a host of saints, remarkable for the stiffness of the carving and desperate contortions of their frames, and many scriptural events, only to be made out by the inscriptions underneath—for, in truth, they were so badly executed that the carvers almost appeared to deserve the same fate; while others were importunately offering their services as guides, and asserting that they knew every part of the city, from the spot where the cock crew when Peter denied his Master, to the rock from which our Saviour ascended to heaven.

We had been prepared for many extraordinary scenes by the perusal of the accounts furnished us by travellers, but the one we witnessed baffles all description. The pen of

a Warburton—now, alas! we fear, silenced for ever—or the eloquent diction of an Eothen, could alone do it justice.

Gentle reader, cast aside the notions you have generally entertained of the topography of Jerusalem. It is not THE JERUSALEM of Scripture. The position of many interesting localities *appear* altered, but it is only the advances of modern ages that have altered the aspect of the Holy City.

The Holy Sepulchre is within the walls, and occupies the best part of the town; it is not *without*.* Calvary of the present day is not the Calvary of the past; and the relics you view smack somewhat of the present age, therefore may not be quite so interesting to most travellers.

From the earliest ages, all Christian pilgrims have turned their thoughts towards the sepulchre of our Saviour, and happy the man who was enabled to visit the "Holy Shrine," and worship at other sacred spots. In the present day, thousands flock to bow down in the Sepulchre of our Lord, and many perish in the attempt.

It does not come within the province of the writer of these pages to comment upon the many wonderful things related to him, or descendant upon the reality of the spots pointed-out; therefore it is proposed only to take a cursory glance of the places as they were visited.

Passing through the motley groups in the crowd, our party went under the pointed Saracenic archway of the edifice, and entered its precincts; in doing so, we could not help observing the beautiful

frieze, in low relief, representing the triumphant entry of our Saviour into Jerusalem, which was placed over the doorway.

We had scarcely entered the building by the gateway, (1)* and passed the stone seat (2) on which the Turkish toll-gatherers seat themselves, and smoke away the dreary hours they remain there, than we saw before us the "stone of unction," (5) on which, it is said, the body of our Lord was washed and anointed for the sepulchre.† Around this precious relic is a low rail, and at either end are three large candlesticks and tapers, the gifts of Christian princes. Here the pilgrims kneel, prostrate themselves on their faces, kiss the "stone of anointing," and offer up their prayers.‡ Space compels us to defer the description of the interior of the Holy Sepulchre for a short time, when we shall continue our Rambles within its walls, and afterwards visit the outside of the "City of Solemnities."

No sooner does the weary pilgrim enter Jerusalem, than regardless of everything else, he hastens to behold the spot where the Saviour of Mankind was laid. It is a natural feeling, but is not judicious. To behold the sepulchre to advantage, the pilgrim should visit the environs and each sacred spot first—the hills, the remnant walls, the convents, and the various historical sites—reserving his visit to the Holy Sepulchre until—

"The twilight star from Hermon's peak,
Comes mildly o'er the glistening earth;
And weary hirelings joy to seek
Their dear domestic hearth."

Then the feelings so long pent up will find vent; the soothing power of religion will subdue the passions that have racked the now repentant pilgrims; and when he leaves the precincts of that edifice, the remembrance of his visit will be more indelible. But as Sir Walter Raleigh said:—

"Give me my scallop-shell of quiet,
My staff of faith to walk upon;
My scrip of joy, immortal diet;
My bottle of salvation;
My gown of glory, (hope's true gage),
And then I'll take my pilgrimage."

To redeem this sepulchre from infidel hands was, it will be remembered, the paramount object sought by the Crusades. It

* Those persons who feel particularly interested in the topography of the Holy City—and who does not at some period of life?—will do well to consult the model executed by Mr. Edwin Smith, of Sheffield. As a work of art, it is well known (see *Family Friend*, vol. iv. p. 178), and being a faithful model of the city as it now stands, a glance at it is worth a hundred pictorial representations. The writer of these *Rambles* always uses one of Mr. Smith's large models for the purpose of lecturing, and has invariably found persons have left the lecture-room with a better impression of the appearance of "Jerusalem as it is," than before he purchased the model. Mr. Smith is unknown to the author of these *Rambles*, but he feels bound, in justice to such a beautiful specimen of art, and accurate realisation of the topography of the "City of David," to recommend its general adoption in schools, families, and all public institutions, feeling convinced that it will do more towards the elucidation of the Scriptures than a thousand prints, or a hundred lectures, without it. Seeing is akin to believing.

* See plan, p. 94. † John xix. 39, &c.
‡ See engraving, page 78.

is presumed to contain not only the sepulchre, but the scene of the Crucifixion. The irregular form shows how the building has

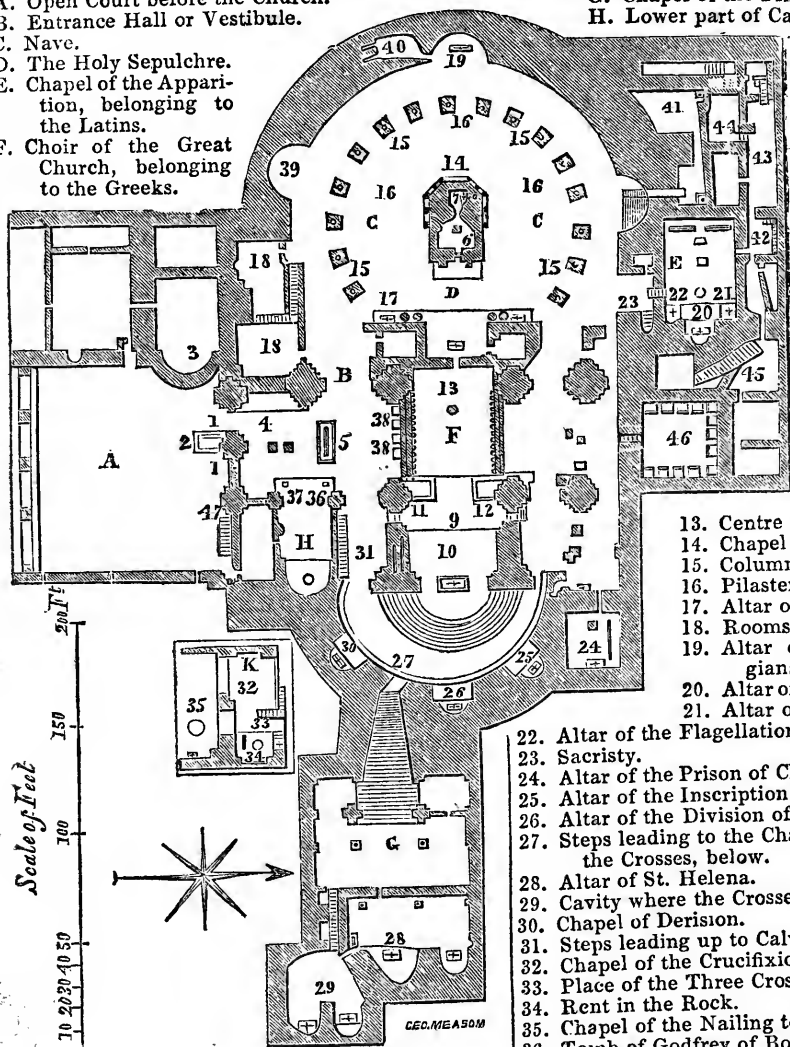
been extended in places, in order to enclose various spots connected with Christ's death and burial.

GROUND PLAN OF THE HOLY SEPULCHRE, AT JERUSALEM.

- A. Open Court before the Church.
- B. Entrance Hall or Vestibule.
- C. Nave.
- D. The Holy Sepulchre.
- E. Chapel of the Apparition, belonging to the Latins.
- F. Choir of the Great Church, belonging to the Greeks.

- G. Chapel of the Finding of the Crosses.
- H. Lower part of Calvary.

- K. Upper part of Calvary.



- 13. Centre of the World.
- 14. Chapel of the Copts.
- 15. Columns.
- 16. Pilasters.
- 17. Altar of the Armenians.
- 18. Rooms of the Armenians.
- 19. Altar of the Syrians, Georgians, and Nestorians.
- 20. Altar of the Holy Sacrament.
- 21. Altar of the Holy Cross.

- 22. Altar of the Flagellation.
- 23. Sacristy.
- 24. Altar of the Prison of Christ.
- 25. Altar of the Inscription over the Cross.
- 26. Altar of the Division of Garments.
- 27. Steps leading to the Chapel of the Finding of the Crosses, below.
- 28. Altar of St. Helena.
- 29. Cavity where the Crosses were found.
- 30. Chapel of Derision.
- 31. Steps leading up to Calvary.
- 32. Chapel of the Crucifixion.
- 33. Place of the Three Crosses.
- 34. Rent in the Rock.
- 35. Chapel of the Nailing to the Cross.
- 36. Tomb of Godfrey of Bouillon.
- 37. Tomb of Baldwin, his brother.
- 38. Tombs of the Kings of Jerusalem.
- 39. Spot where the Disciples contemplated the Crucifixion.
- 40. Sepulchre of Joseph of Arimathea.
- 41. Cistern.
- 42. Entrance to the Apartments of the Franciscans.
- 43. Refectory.
- 44. Stairs leading to upper Galleries.
- 45. Stairs leading to upper Rooms.
- 46. Former entrance to the Church, now enclosed.
- 47. Entrance to the Chapel of our Lady of Grief.

- 1. Gateway.
- 2. Stone Seat.
- 3. A ruined Tower, the ancient Belfry.
- 4. Divan of the Turkish Toll-keepers.
- 5. Stone of Uncion.
- 6. Ante-Chapel.
- 7. Sepulchral Chamber.
- 8. Tomb of our Saviour.
- 9. Ichonostation.
- 10. Sancta Sanctorum.
- 11. Chair of Greek Patriarch of Jerusalem.
- 12. Chair of the Greek Vicar.

ARCHITECTURE A WITNESS OF RELIGION.

ARCHITECTURE having called upon Painting and Sculpture to beautify her by the addition of their graces, and then having availed herself of them, at once assumed several new and important offices in their name. For men naturally asked, "What shall we paint, and what shall we sculpture?" What could they do? Either simply imitate nature, or depict their manners, and illustrate their history. If in the temple, depict the story of the gods and heroes; if in the public hall, the actions of their ancestors. It is said they were ignorant of landscape painting, and what other painting there was has perished: the sculpture remains to tell us with what success men achieved the objects they had in view. The temple soon enshrined its sculptured god: its walls probably displayed his painted myth; the revelation in colours of his attributes and creed. And thus architecture assumed another office—she became a *witness* of religion—she handed down the faith of nations to their posterity—the same Minerva sat calmly in the temple as sat there before—the same Jove frowned with marble brows and menaced with his dreadful thunder, as frowned and menaced of old, when art first made him. It is a duty of your art to witness and commemorate the faith of the people among whom it is cherished. It is right that the temple should itself be a Bible in stone, an unalterable record of truth, an imperishable witness of creeds. It is right that the very walls should have an expression and an eloquence for the eye, for the eye has as great a claim to an exalted usage as the ear, and if that may without objection be the vehicle of the mind of truth—the channel by which the religious orator pours in 'his flood' of refined speech—so may the eye be the glass through which the religious painter may let fall the lines of beauty in living representation on the soul, the gate by which the illustrative ideas of the sculptor may enter and find rest. Did the Creator exalt the ear above the eye? Meant He, when He gave us several senses, that we should learn of him but through one? Did He design in bestowing on us several faculties, that we should trust alone to eloquence to illustrate

His attributes, and that of all powers, eloquence alone should teach religion, and only the ear attend to it? Never were supposition more ridiculous. But yet in our day, even concerning architecture, there seems to be an extraordinary opposition of parties under the several badges of the ear and the eye. These, delighting in eloquence, exalting it over all other things, swearing as well by the least word as by the most artfully elaborated period of their favourite pulpit orator, declaring the silent eloquence of artistic grace and symbolic ornament to be little less than accursed, may be styled the party of the ear. Those, loving symbolism to excess, greedy of ornament, pledged to display, insisting on the graces of the suggestive arts, regarding the eloquence of the preacher as dangerous, if not needless, may be called the party of the eye. The ear and the eye, the eye and the ear! and men to whom both belong rending each other in their several causes. Strange and inexplicable thing! For the soul is like one sitting in a chamber with several doors which are the senses, and through which, or some of which, she must be approached. Can any one show how he reaches the soul without opening any of these doors, or why the door he may best be able to open is a better one than all the rest? Hearing only is right, says the man of speech—sight, says the man of art—smell, says the perfumer; we shall soon come to touch and taste. Why, this puts one in mind of Messieurs le philosophe, le maître d'armes, and le maître à danser, in the *Bourgeois Gentilhomme*, where they dispute on the superiority of their several professions, and finally end in a general struggle about it, leaving their pupil to help himself if he can. But we have a right to avail ourselves without abuse, of all our senses: we may look for the genius of Raphael, and hope for the eloquence of St. Paul. Architecture (and the other arts) are in peril from this absurd contest; for if it once be allowed that the cause of religion is best served by their utter insufficiency and wretchedness, then is the first blow stricken at them, then is the battering of the wall begun. We ask not in a church for gaudiness, for tinsel, for an impure and diseased decoration, for mythical monsters, for devils in stone and in paint; we seek only pure majestic beauty,

chastity of design, a sacred elegance, a holy grandeur. Let none use the arts of rhetoric to destroy architecture, and her sisters; for every word the orator aims at them, every argument prepared for their destruction, will become a weapon that must slay its wielder. Eloquence is now put in this position: she is forced to say, "I am exciting, charming, persuading your senses, to make you believe they have no right to be charmed, persuaded, or excited by any one else." What is there more injurious in colour or statuary than in rhetoric? Indeed, there is more risk in the latter. For the subject of art being once well chosen it remains when executed for ever the same; but the purpose of rhetoric may be subtle and variable as the inclination of man. But we need not enter further upon this, being convinced that we have a right, under the sway of careful judgment, to use all our senses, and to submit them, by the lamp of reason, to the guidance of art. Everything may be used, everything can be abused; for us it is to use and not abuse. But are we to be cold and dumb and still? O Art! Art! how wert thou fallen if, of all the consoling spirits that have descended to cheer the earth, thou alone wert forbidden to worship in the temple of thy God.—*From a paper in the Builder, entitled Architecture and her Offices.*

EFFECTS OF MONOTONY ON HEALTH.

"No man, for any length of time," says Dr. Draper, a clever American writer, "can pursue one vocation or one train of thought without mental injury—nay, I will go farther, without insanity. The constitution of the brain is such that it must have its time of repose. Periodicity is stamped upon it. Nor is it enough that it is awake and in action by day, and in the silence of the night obtains rest and repair; that same periodicity which belongs to it as a whole, belongs, too, to all its constituent parts. One portion of it cannot be called into incessant activity without a permanent injury ensuing. Its different regions, devoted to different functions, must have their separate times of rest. The excite-

ment of one part must be coincident with a pause in the action of another. I do not think it possible for mental equilibrium to be maintained with one idea of one monotonous mode of life. There is a necessity for men of great intellectual endowments, whose minds are often strained to the utmost, to fall back on other pursuits; and thus it will always be that one seeks refuge in the pleasures of quiet country life, another in the chase, another in foreign travel, another in social amusements. Nay, with all men, even those whose lot has been cast in a more lowly condition, whose hard destiny it is to spend their whole lives in pursuit of their daily bread, with one train of thought, and one unvarying course of events, what would become of them if it were not for such a principle as this? Men often say that the pleasures of religion, and of a Christian faith, are wholly prospective, and to be realized only in another world. In this they make a mistake; for those consolations commence even here, and temper the bitterness of fate. The virtuous labourer, though he may be ground down with the oppressions of his social condition, is not without his relief; at the anvil, the loom, or even at the bottom of the mine, he is leading a double existence—the miseries of the body find a contrast in the calm of the soul—the warfare without is compensated by the peace within—the dark night of life here serves only to brighten the glories of the prospect beyond. Hope is the daughter of Despair. And thus a kind Providence so overrules events, that it matters not in what station we may be—wealthy or poor, intellectual or lowly—a refuge is always at hand, and the mind worn out with one thing turns to another, and its physical excitement is followed by physical repose.

I MUST repeat to you an opinion I have long held, that no man had ever more than one conception. Milton emptied his mind in the first part of *Paradise Lost*; all the rest is a transcript of self. The *Odyssey* is a repetition of the *Iliad*. When you have seen one Claude, you have seen all. I can think of no exception but Shakspeare; he is always varied, never mannered.—*Archdeacon Fisher.*

THE BIRD TALISMAN.

AN EASTERN TALE.

FOR THE TUTOR'S YOUNGER PUPILS.

(Continued from Page 111.)

THE parrot told the princess, who was lying by herself under a tree, to rise and follow the daws, who showed her the way to the water-melons. The gipseys were too much exhausted, and too much taken up with their own sufferings, to pay any attention to her movements, so nobody tried to stop her. She had the greatest difficulty in dragging herself along through the hot sand, but at last she reached the water-melons, and seizing the first she saw, soon

quenched her thirst with its refreshing juice. She gave some to the three birds, and then, being quite refreshed and strengthened, she gathered two more of the melons, and hastened back with them to the well. The gipsey woman was so delighted at the sight of the melons, that she clasped the little princess in her arms, and almost stifled her with kisses. The two melons were divided amongst the other children, and then the princess showed them all the way to the water-melons, donkeys, dogs, and all; and a delightful feast they all had, for the ground was covered with them. The poor dogs had suffered most from thirst, and it was a strange sight to see them lapping up the juice of the melons that were given them. The camp was pitched by the side of the



melons, and next morning, after another hearty meal on them, they set off on their march, taking care to load the donkeys with as many melons as they could carry, for fear they should find the well dry at the next stage, which, however, was not the case; and they crossed the remainder of the desert without further difficulty or adventure. They were all doubly kind to the little princess, now that she had saved their lives, and the gipsey woman told her that she would restore her to liberty if she could, but that her husband would not let her. "But do not fear," she said, "I will take care that you shall only be sold to a good mistress, who will bring you up well, and make you

happy." A few days after this conversation, they came in sight of the towers and minarets of the great city of Lahore. They encamped in a grove not far from the gate of the city, and the gipsey woman having mixed some white powder, which she took out of a little box, with some water washed the princess with it, and her skin became as white as before it was dyed brown.

The next morning the gipsey woman took the princess into the city with the parrot on her arm, and after going through a great many streets, they reached a bazaar where was the slave-market. The slaves were sitting on the ground, all round a large hall; an old man with a white beard sat in

the middle of the hall on a carpet, smoking a pipe, and he had before him a number of account-books and pens and ink. To him, the gipsy woman brought the princess, and after whispering a few words to him, she took the princess to one side of the hall, where were seated several little slave girls—some white and some black, under the care of a very cross-looking old woman, who grumbled a good deal about the princess bringing her parrot with her; but the gipsy woman told her they were to be sold together, and promising to come for her in the evening if she was not sold, she left her in charge of the old woman.

The little princess felt both fear and sorrow at being left in the hands of strangers, and she sat on the ground amongst the other slave children as much out of sight as she could; she hugged her parrot in her arms, and kept her hidden in the bosom of her little gown, for fear she should be taken from her. Several persons who came to buy slaves, looked at her, and asked her price of the old man who managed the sales, but the price he mentioned was too high for them. At last, a lady with a very forbidding countenance came by, and after looking at her, went to the old man to ask her price. The old woman who had charge of her, on seeing this, said, "I hope that lady will not buy you, for she is the worst mistress, and the most cruel woman in all the city. It is only last week that she drove a poor little negro slave girl to such desperation, by her ill usage, that in trying to escape over the walls of the court of her house, she fell to the ground and was killed." "Oh," said the little princess, "pray do not let me be sold to her." "I will not," said the old woman, "if I can help it: but the old man can sell you if he pleases." "At least," said the princess, "do not let me be sold without the gipsy woman knowing; for I saved her life, and the lives of all her family, and I am sure she will not let that horrid woman have me." Now the parrot heard all this, and putting her head out from under the princess's gown, she whispered in her ear, "I will go and fetch the gipsy woman;" and she flew straight out at the door of the bazaar, and from thence over the houses, till she came to the gate where they had entered the city; a little way outside of this gate she found the gipseys encamped, and flying to the gipsy

woman, she alighted on the ground at her feet, and taking the hem of her gown in her bill, gave a pull at it, and then began to shuffle along the ground towards the gate,



chattering and making all sorts of signs with her head that the gipsy should follow her. The gipsy saw what she wanted, and followed her towards the city gate, and the parrot kept flying before her and then perching till she brought her all the way to the gate of the bazaar. Just as they got there they met the ill-looking lady coming out, holding the princess by the arm, who was crying bitterly; and there was a crowd of people about the gate of the bazaar, crying shame on the lady, and calling her a murderess and all sorts of names, and saying it was a shame she should have the little girl, for she would kill her as she had so many other slaves. As soon as the princess saw the gipsy woman she made a sudden spring, and escaping from the grasp of the ill-looking lady, she threw herself into the arms of the gipsy, and begged her not to let her be sold to that dreadful woman. The gipsy was moved, and assured the princess she should not be sold to her; but the ill-looking lady said, "She is sold to me already; I have paid for her, and here is the receipt." And she drew a bit of paper from her bosom, and held it up in her hand, when the parrot, flying suddenly over the heads of the crowd, snatched the paper from her hand, and flew away with it out of sight, and hid it at the top of a mosque close by the bazaar, and then flying back again, perched quietly on the top of the gate of the bazaar, where she could see all that took place. By this time the disturbance was so great that the cadi, or judge, who lived near at hand, heard of

it, and came to the bazaar with all his men, to see what was the matter, and to keep the peace. Some cried one thing, and some another; the ill-looking lady declared she had bought the little girl, and the gipsy woman declared she had not sold her, and the people cried out it was a shame to let that vile murderess have her. The cadi ordered them all to be brought before him, and said to the ill-looking lady, "If you have bought the little girl, show me the receipt." She declared that the receipt had been snatched out of her hand by a parrot, and carried away. "I don't believe that," said the cadi, "and unless you produce the receipt, I shall give up the little girl to the gipsy woman." It was in vain that the ill-looking lady repeated what she had said;

those who had not seen the parrot declared it was not true; and those who had would not say anything about it, so the princess was restored to the gipsy woman, and the ill-looking lady went away looking worse and more dreadful than ever, for she had lost her victim and her money too. The judgment of the cadi was given in the street, under the windows of his own house; and the princess was no sooner delivered to the gipsy, than a black slave came to her, and told her the cadi's wife wanted to speak to her; she followed the slave, leading the princess by the hand into the cadi's house, and they were brought to the cadi's wife, who was sitting in a room with a balcony over the door of the house, with her little daughter by her side, who was about



the same age as the princess, and who, having seen what had passed in the street, and being much taken with the appearance of the princess, had begged her mother to buy her. This was soon managed; the cadi's wife offered the gipsy woman a handsome price, and the princess was so much pleased with the looks of the cadi's little daughter, and of her mother, that she begged the gipsy woman to sell her to them, which was accordingly done; and the gipsy departed with her money, taking leave of the princess, and telling her she was in good hands, and would lead a happy life. After she was gone, the two little girls came into the balcony to look at the departing crowd, and the parrot, which was watching all that took place from her perch over the gate of the bazaar, soon perceived her little mistress in the balcony, and flying

to her, perched on her shoulder. The cadi's daughter was much surprised, but the princess soon explained to her all about the parrot, and begged to be allowed to keep her, which was immediately granted. The two little girls became much attached to each other, and led a very happy life together, learning the same lessons, and playing and taking their meals together, and sleeping in the same room; for though the princess was really the slave of the cadi's daughter, she was treated just as if she had been her sister; and before many days the princess had told her all her story, and had even let her into the secret of the magic ring. One evening, after supper, the parrot said to the princess, "My dear, I think we had better let your grandfather know where you are; he must be very anxious about you, and to-morrow morning I will send the

two daws, who roost every night on the minaret of the neighbouring mosque, to give him intelligence of what has happened to you, and to learn what are his wishes concerning you." The princess gave her consent, and early the next morning she wrote a letter to her grandfather, and gave it to the parrot, who carried it to the daws, and desired them to lose no time in taking it to the old hermit at the source of the Ganges, and in bringing back an answer.

The old hermit had begun to be very uneasy about his grand-daughter, when one evening the two daws made their appearance with the princess's letter; and the old hermit, after having read it, wrote an answer, and delivered it to the daws, who, having stayed one day at the hermitage, to rest from their journey, flew back again to Lahore, and carried the hermit's letter straight to the apartment of the two little girls.

(To be continued.)

A QUICK WALK FOR AN APPETITE.

BY ROCHESTER.

IT was a clear, cold afternoon, with the wind blowing briskly straight from the north, through the spotless blue depths of the sky; and although cheerful Phœbus had striven all day long to soften the stern features of the winter-land, his amorous efforts had only called up a faint smile on the face of the fresh green meadows, and here and there unloosed the ice-bound paths; but in general, the naked roads were hard as iron, and the shaded borders of the half-frozen fields, still candied with hoar-frost, had the appearance of an almost unlimited supply of that most delicious confection ycleped "Angelica," a sweetmeat which, I doubt not, many of my juvenile readers have met with, when delving into the luscious recesses of a paper of a certain heterogeneous congregation of delicacies, that form a popular and delectable gift at the season of fairs and wakes, when Corydon purchases sugar-plums as well as blue ribbons, wherewith to win the favour of expectant Phillis. Among the stiff, hoary herbage, that furred the road-side, poor starved birds were hopping about, glancing up towards one now and then, in a shy,

piteous manner, as if they would say, "Don't you wish that the weather was a little warmer? It is so chill, and all the polished scarlet hips are gone from the jagged thorn-brake yonder, leaving in their place a wild fringe of sharp glassy icicles!" It was, certainly, rather severe weather, and that I experienced as well as did those little feather-clothed beings, that were moping about so cheerlessly and silently, with their plumage all ruffled in the frost; but, defended by the thick folds of a good stout wrapper, I cared little for the whistling blast, and had set out to warm myself by exercise, and from the bracing properties of fresh air, scenery, and objects of contemplation, to procure a relish of that sauce which has been universally pronounced paramount to Soy, Chutney, or the most piquant of Soyer's own. I did not, however, forget my poor little bird-friends, but scattered a few bread crumbs which I had crammed into my pocket for this purpose; and when these were dissipated, I was obliged to content myself with the hope that others might afford relief to the rest of the little outcasts that chirped so piteously, or perched, dumb and awkward as specimens of tyro-taxidermy, on the prim stark hedgerows. As I was passing the gate leading to the Harringtons' house, Annie and Reginald made their appearance, muffled up in fur and great coat, prepared for a scamper.

"Ah, mes amies, je suis bien aise de vous voir," I greeted them. "The rude violence of Boreas does not prevent you from venturing out," I added, as I shook hands with Annie.

"Mais, non Monsieur, with Peggy for my protector, I do not fear facing the grim-mest tyrant."

"And where are you going?"

"We don't know," answered Reginald. "Anywhere in search of adventures; so if you can tell us in what part of these desolate regions there may be a magician's castle, on which distressed damsels are hanging by the hair of their heads, waiting for a 'Sir George' to deliver them, here am I, your humble servant; and if you can devise any expedient by which Annie's words could be converted into pearls and diamonds, she will be charmed to put it into immediate practice."

"It being a rule, unalterable as the law

of the Medes and Persians, that the knights and ladies of romance should always be attired in fancy costumes," I observed, "the gentleman's armour being of the most gorgeous sort, and the robes of the disguised princess of the lightest and most becoming description, I cannot suppose, for one moment, that the two figures before me, enveloped in bear-skin paletots, ermine victorines, Berlin-wool muffatees, and their feet shod with boots which, for thickness, would be a credit to a ploughboy, can be a genuine hero and heroine. I would, therefore, advise them to take off their stilts, and in the company of an ordinary mortal like myself, go forth in search of adventure, somewhat different from the frothy ones of romance."

"You are not at all complimentary, my dear sir," rejoined Reginald, laughing. "Granted that our present vesture is common-place, and illegal (for the initiate might not cast away his grasshopper), it would be easy enough for me to return this instant to my castle, and don the calico helmet and canvas shield in which I slew the dragon of Christmas eve; and then I appeared, indeed, a 'very gentyl knight;' did I not, Annie? For we had a mummer's play, and all kinds of fun. But come, Rochester, we will walk with you, if you will allow us, and I will give you a full description."

"What says Annie to your so suddenly setting aside your imposed knightly adventures?" I asked.

Annie smiled. "It is nothing new," she said, "for Telemachus to give up Calypso at the beck of Mentor."

"Well done, Annie; that was cleverly said. But Calypso has no objection to a march along the Learley-road?"

"None in the least; for this is the first chance we have had of a chat with you since your return from Vandyck Hall:" and we set off.

"What shall we talk about," asked Reginald, as we tripped across the wind-swept down that led towards Learley, and where the strong driving gusts threatened to whirl us away over the precipitous sea-cliffs, and out—out, over the roaring main, like stray autumn leaves."

"I am come out to get an appetite for my dinner," I replied, "and just before our encounter, I was considering the immense variety of diet that is used by the human race."

"What a subject for the contemplation of a philosopher!" Annie exclaimed, ironically.

"Nay," I returned, "does not Sterne declare, that when one has resolved upon the matter, 'Cappadocia, Pontus and Asia, Phrygia and Pamphilia, are as good a text as any other.' The curiosities of diet are, I opine, more entertaining than one would at first imagine."

"I remember, last summer, seeing old Betty Limp gathering nettles, which were to serve her in the place of greens, for her meal," said Annie; "and you know that the poor people about here feed on the common whelks which they pick up on the beach; and they will not believe mamma, when she assures them that the fish are dreadfully unwholesome."

"They have experience on their side, and I think that will conquer theory. 'One man's meat is another's poison,' to quote a vulgar aphorism. Hercules slays the crab sent by Juno to persecute the hero; Morgante is bitten, and perishes. The whelk is a coarse, indigestible animal, to those unaccustomed to them; but I doubt not they are rather a delicacy to such of the poor as are in the habit of tasting no better fare. To you, a plate of Russian 'Batinia' (an iced soup, composed of mustard, putrid sturgeon, acrid unpalatable gourds, and other nameless abominations,) would be more odious and disgusting than the scent of the burning fish-liver was to the fiend Asmodeus, when he fled from the chamber of Ragnel's daughter; and in Russia it is esteemed exquisite. Whale-oil and sawdust, with junks of decayed salmon or seal-flesh, would not be an inviting provision for us to sit down to; while, as Sir John Ross has observed, the Esquimaux, scorning southern dainties, finds blubber a sweet-meat, and train-oil preferable to maraschino. Habit draws some, and necessity drives others, to relish the strangest, and, apparently, most improper viands; and I dare say old Betty Limp enjoyed her nettle-tops (than which one cannot have a more healthful spring vegetable) as much as ever you relish the finest blanched sea-kale, or Jerusalem artichokes in white sauce. In Lapland, milk is used when turned sour; and fish is not deemed eatable till it is in a state of semi-putrescence; and I have seen Swedish sailors making their repast off

a ray, or skate, that had been kept hanging on the ship's rigging till it was quite black and rotten, in a state no British tar could possibly touch. So you perceive it is not everybody that requires even their fish to be fresh, and what to ourselves would be pre-eminently loathsome, forms the *bonne bouche* of our neighbourhood."

"It seems to me," Reginald observed, "that the northern nations are far coarser in their choice of some eatables than the inhabitants of warmer climates."

"You surely forget," replied I, "that it is among the dark-skinned races that cannibalism—that most frightful enormity, has its hold. It is, nevertheless, true, that in northern latitudes we meet with examples of very odd articles of diet. The dwarfed Esquimaux, when fish and flesh are scarce, deriving a scanty sustenance from a kind of lichen (almost the only vegetable product of those inhospitable arctic realms); the Greenlander and Kamtschatdale quaffing fish-oil as a pleasing beverage; the Tartar devouring horse-flesh; and the Norwegian making use of a bread compounded of the barks of trees—present, each of them, aspects of humanity, not only very different from those that come beneath our daily notice, but excessively repulsive and base; while the simple food of the patient Hindoo, whom a handful of rice and a little curry serves to satisfy; the few ounces of gum on which the gum gatherers of Senegal, during the season, make their daily meal; and the fruit and vegetables which supply the Paradisean larder of the children of tropical America, although equally peculiar, are not so displeasing in our eyes as the hyperborean diet, are thus rather worthy of imitation from their simplicity and natural elegance. One cannot but admire a relic of the golden age!"

"You would almost persuade us to take up our residence under the Line," cried Annie, "and to become vegetarians and teetotallers."

"One may do worse. I do not approve of extremes, and am contented to occupy a spot in the temperate zone, and be temperate in all things, without being hyper-abstemious; the golden maxim of our friend Horace for me! But I was about to observe," I continued, "(to taste the sour half of the Istakar apple), that in the same southern regions we likewise meet with Otto-

mans feeding on clay; Indians of the Brazilian pampas emulating Tartars in their passion for mare's-flesh; Hottentots, like brutes of the lowest class, devouring raw sprouts and roots of plants; and although the veneration for life under any form is so extreme amongst the Oswal tribe of Hindoostan, that they wear gauze over their mouths and nostrils, lest they should inhale an insect with their breath, I have read of a Hindoo whose appetite was so morbid that he would eat a living sheep, wool and all! Thus, extravagance and eccentricity of diet is not confined to the hordes of the north."

"Pray tell us of a few of the pet dishes of European epicures, to counterbalance *ces morceaux choquants*," Annie interposed. "After such a programme of 'the horrible,' anything will be delicious."

"Let us see; do you wish to hear of the rare flavour of the green fat of turtle, venison, of the luxury of truffles, or the coveted fin of turbot, the exquisite cookery of a *vol-au-vent*, or a Strasburg *pate de foies gras*?"

"No, no, no," remonstrated Reginald, "we know all about these sort of things; I would much rather listen to an account of the choice morsels of a denizen of the planet Jupiter, than those of a cockney councilman."

"What must I do?" I demanded, "here is your sister begging to be regaled on coffee and cake, or some such novel dainty, whilst you, with all the indignation of the conqueror of the Antipodeans, exclaim—

'Hashed pork! Shall Chrononhotonthologos
Be fed on swine's flesh, and that second-hand!
Now, by the gods, thou dost insult us, general.'"

We all laughed, though Boreas was raving louder and louder as he strained by us in his boldest mood.

"You must learn, Annie, that according to ancient tradition, the humming-bird ventures within the jaws of the crocodile for the sake of picking its teeth, and if this is not absolutely correct, inasmuch as it is the trochilus, a species of plover, instead of the fairy-birds of the west, that are addicted to this perilous mode of catering, the story will serve to illustrate how that the fairest and most delicate may derive subsistence from the terrible and ghastly; and it may be well for you to reflect on the discomforts and degradation of your

fellow-creatures, the Hottentot and the Esquimaux, if it induces you to value more highly the blessings of civilisation. Still, I vote with you that we may fitly turn our eyes towards a few agreeable objects, after the contemplation of the foul or ungainly. I would much prefer being confined to the delicacies of Apicius, than being compelled to lecture on the beefsteaks of Abyssinia, for a description of which (including the 'Shulada') I must refer you to Bruce. I have heard of a Russian countess who was even richer than the queen of Sheba of famous memory; but whereas the sovereign's wealth consisted in 'a great train, in camels, and in precious stones,' and the might of the countess lay in her forty or fifty thousand slaves, horses, corn, tallow, &c.; I have never hesitated in giving preference to the luxurious magnificence of Solomon's far-famed admirer. So, if you have no objection, we will make a compromise betwixt the Epicurean and the Cynic, and as your appetite is fastidious, I will at once recommend the rare dishes of Sir Epicure Mammon, who desired to imitate Apicius in feeding on

'The tongues of carps, dormice, and camels' heels,
'Boil'd in the spirit of Sol and dissolved pearl.'

"Dormice!" cried Annie, "who could be so savage as to injure those darling little creatures? What Scythian would have the heart to destroy my two pets, Swishtail and Jewel!"

"Alas! Annie, pity was not often domiciled in a Roman breast; and I believe it is to the toga-bearers we owe all the reputed luxury of roast dormouse, which, I should inform you, to gratify the *bon vivant* of the 'seven hilled city,' *urbs septicollis*, was seasoned with poppy-juice, and honey from Hybla, the sugar of those times."

Reginald declared that none could complain that the sauce was not befitting. To this Annie gave in; "the cooks of modern ages," she agreed, "could not have lighted on anything more appropriate; the honey to express their sweetness of disposition and engaging playfulness, and the narcotic causing a dreamy forgetfulness like that which overpowers half the lifetime of these elegant little animals."

"I should very much like to taste Hybla honey," observed Reginald. "Have you ever done so, Rochester? You said

the other day that you had drunk Falernian wine."

"But I have never met with any of the formerly choice product of Sicilia's isle. *Apropos* of honey; that of Attic Hy-mettus, which was also loved by our classic friends, is still held in great repute. The honey of Narbonne you have eaten; it is deemed particularly excellent by many; but for my own part I fancy that the wild thyme of Bullerton Down imparts a flavour to our home produce, of higher delicacy, and renders it the peer of Ambrosia itself! The wild honey of Australian forests, which is sought after by the aborigines, is made by a minute, stingless bee, not so large as our ordinary house-fly; and so fond are the natives of it, that they will even take the trouble to fell a tree in order to procure a nest. The fondness of bears for this sweetmeat is proverbial, and in books of natural history, you must often have read of its bird-conductor, the honey-guide, and of the extraordinary manner in which those citizens of the woods will assist one another in procuring their mutual desire. Honey is of a healing, refreshing property, and is of use in medicine. How were the eyes of the beloved Jonathan enlightened by it, when, faint from the 'extreme toil' of war, he stretched forth his rod, and, by tasting but a drop of the forbidden food, brought upon himself sentence of death! Mead and metheglin, two ancient British beverages, which you may meet with occasionally in some secluded farm-house, or at the table of those who are fanciful in such matters, are both manufactured of honey, but retain too much its luscious, cloying nature to form a very tempting substitute for sherry or Madeira. Fifteen centuries of years ago it was the wine of British kings; and yet earlier was in use among the barbarous people of this now highly cultivated island. Ages and ages off, in the dim past, when the woad-stained, idolatrous, angelically handsome sons of white-cliffed Albion, were in truth *Βαλανηφαγοι* *ἔνδρες*, 'acorn-eating men,' like the Arcadians of Greece, who continued to exist on the seed of the oak long after the Argives had given up their pear-diet, and the Athenians had suffered bread to take the place of their primitive repast of figs—ages and ages ago, when our forefathers lived as those (according to Milton) should

live who would write an epic poem—when a handful of berries, moistened by the hill-side spring, was the general refreshment, ‘and falling acorns furnished out a feast.’ Very different is the superabundance of the collation now in vogue; very different are the snowy, mountainous iced creams, and pink *meringues*, eagerly swallowed in apartments whose temperature rivals that of Mesopotamia. Yet, at present, as well as then, and as when Jesus the Son of Sirach rejoiced in his God-given wisdom, ‘the bee is little among such as fly; but his fruit is the chief of sweet things.’

“While on this subject, I may as well mention the curious method by which the Assyrians of Egypt contrive to obtain for their swarms ‘a perpetual feast of nectared sweets,’ as related by Dr. Bevan. The flower harvest being many weeks earlier in Upper Egypt than it is in the lower districts, the hives of the various hamlets in the latter region, having been collected in parties about the close of October, are conveyed up the Nile, and being placed on rafts, arranged one on another in a pyramidal form, marked and numbered individually according to their respective owners, they are allowed to float on down the stream, pausing here and there at different stages of the journey, either for a long or short interval, in proportion to the abundance or scarcity of the blossoming shrubs in their vicinity, which is determined by the gradual sinking of the float, as the hives get heavier with the increase of their mellifluous burdens. After a three months’ delicious voyage, during which these epicurean bees have industriously revelled amidst the dark glossy foliage, fair buds, and golden orbs of the orangeries of the Said—have drained the nectar of Arabia’s jessamine, and stolen from the prodigal riches of the roses of Faioum, they return to their masters, bearing the accumulated treasures of many lands.”

“The honey of these highly-favoured, voluptuous little insects ought to be pre-eminently nice,” said Reginald.

“And,” I returned, “the minds of those who enjoy the advantages of travel and education should, in like manner, be tinctured with the essence of those benefits which are denied to others. Where much is given, much is required. While we can see in what way the talent of another

should be applied, we should examine ourselves, whether we are making just use of our own, lest, when it is demanded of us, we should with shame be obliged to confess, with the unprofitable servant, that we had suffered it to rest idly, wrapped up in a napkin. The varieties of food,” I resumed, “are said to influence the characters of nations; nor is this in the least degree improbable. To the plain black bread and broth of Sparta’s public tables may, I think, be partly traced the stern simplicity of that iron-sinewed race. In the simple fare of Lycia, continuing for ages unaltered—a cluster of dates and a little water, flesh being seldom tasted except at a feast, or the arrival of a stranger, &c.—we view the patriarchal tent-life of these ancient and interesting desert-folk, whose characteristics have remained unchanged while the whole world else has undergone a revolutionary avatar. From the habit of devouring raw food, *et cetera*, common among uncivilized races, may arise that ferocity and irreverence for life which distinguishes barbarians; and I have heard it contended that our own simple ‘roast and boiled’ has had vast influence in nurturing that sturdy honesty of heart which is the especial heritage of an Englishman. If certain kinds of food can affect individuals, why may they not affect the mass? Fuseli, and Mrs. Radcliffe, the authoress of the *Mysteries of Udolpho*, it is affirmed, were in the habit of courting wildness of fancy by making use of undressed meat. Sir Isaac Newton, during the composition of his renowned work on optics, is known to have lived entirely on vegetables, finding that this regimen enabled him to reflect more deeply than any other; and if further proof were wanting, did not Lucian, when metamorphosed into an ass, regain his human shape by cropping the roses that adorned the theatre?”

“*En ce cas là*,” observed Reginald with a smile; “we may manufacture our own characters. Jews may lose some of their national peculiarities by the patronage of swine-flesh; the Chinese, at the same time, explode their chop-sticks and false perspective; and we partake of the sunny lightheartedness of the French by a course of fricaseed frogs—be imbued with Italian urbanity by dining on macaroni, and even

learn Japanese by the avoidance of all animal aliment, not excepting milk."

"*On peut tout dire en riant*—one may say anything in jest," I answered; "Reginald shall make the experiment. But what do you say, Annie, to being transfigured into a celestial belle, with a deadly complexion, and vacant, peeping eyes, by swallowing a few basins of bird-nest soup, a plate of broiled mice, and an unlimited quantity of the most aromatic tea?"

"That would not give me lotos feet, and without them I should be discontented. But I have no desire to change my condition. I often congratulate myself that I am English; so, if Reginald makes the trial, I shall not."

"Oh!" exclaimed Reginald, "I would not alter my birth-place to be Kossuth himself! What country can be compared to our fatherland? None—none! 'Great is Diana of the Ephesians!'"

"You remind me," said I, "of a passage in Sir John Mandeville's *Travels*, which I came across yesterday morning. As nearly as I can recollect, it stands thus:—'In fro what partie of the earth that men dwell, outhr aboven or beneath, it seemeth always to hem that dwellen there, that they gon more right than any other folk.'"

"How do you manage to remember things so well?" inquired Annie. "I can never retain a quotation in my mind. Have you any charm about you that works this effect?"

"Pliny's receipt for the strengthening of the memory is, I believe, a paste compounded of swallows' hearts, ammonium, and cinnamon; but I, rarely having felt a need of this medicament, have never employed it, so cannot say whether it is serviceable or not. From my own experience, I would recommend persons desirous of improving their reflective faculties not to endeavour to remember too much at first, but, in the course of their daily study, always to settle upon some particular sentence or paragraph, and observing it attentively, try at different periods (each one longer than the last) to repeat the words, or at least to recal the sense of the passage; and should they seem to have lost it, not to refer directly to the book, but sedulously to turn over the leaves of their mind, till they light upon the hidden thought, which will greet them

unexpectedly—like a gem in the dark caverns of a mine—like a fragrant leaf-encrusted violet—like little Moses, abandoned amid the bulrushes of the Nile! For, whatever one may suppose, nothing is lost; nothing is completely erased from the tablet of memory, but is only hidden by the superincumbent mass of continually accumulating ideas, which cover one another as the successive leaves in autumn forests; and so the reference to the volume only adds a fresh particle to the heap which already concealed the first and most vivid impression—which impression, vivid as it is, may, through indolence, lie ever buried in the mine—may waste its fragrance unused and undiscovered; but if sought after with perseverance, may be rescued from among the water-flags of oblivion, in after days to be a lawgiver, a saviour! And now, as an exercise in point, can you repeat the words that brought about this digression?"

Annie.—"No; but they were from Mandeville, and were to this effect—that self-conceit was universal."

Myself.—"Good: and what introduced the quotation?"

Annie.—"Reggy's complimenting his native land."

Myself.—"And what preceded this?"

Annie.—"Something about the effects of food on mankind."

Myself.—"Very well; this brings us back to our subject—the curiosities of diet, and the undeniable truth of the old proverb, '*De gustibus non disputandum est.*' The alderman who dined with my Lord Peter, in Swift's *Tale of a Tub*, pronounced that 'beef is the king of meat. Beef comprehends in it the quintessence of partridge, and quail, and venison, and pheasant, and plum-pudding, and custard.' On the other hand, an American Indian would rather gorge himself with rank armadillo, or the roasted grubs of a wasp's nest. I know no stranger tit-bit than a snail, yet it hath been esteemed by both ancients and moderns. I have heard foreigners assert that a well-fattened snail is the choicest of morsels! Those of Ulm, on the Danube, are especially admired for their matchless savour, being fed on strawberries."

"The ancients kept them in boxes filled with sweet herbs, and other tempting

nourishment, did they not?" asked Reginald.

"You are right. Pliny mentions snails whose shells would hold ten quarts apiece, and I presume it must have been from their glutting them with such superb food that this prodigious size was attained—that is, if we are to put any credence in the anecdote of this great, but often fabulous naturalist."

"I would rather lunch off snails that have been feasted on ripe, ruddy strawberries, than off locusts that have desolated an entire vegetation," Annie said; "and I have read of their being eaten in oriental lands."

"Yes; Morier tells us that the lower orders in Palestine make use of them, and when boiled, the yellow ones turn red, and resemble stale shrimps, both in taste and appearance. But Miss Annie Harrington would be rather fastidious in her choice of food, I conceive, and would not accommodate herself to her circumstances, and, with Madame Ida Pfeiffer,* taste roast snake at Singapore, to learn what it was like—(by the bye, she says it is more delicate than chicken)—or, with Waterton, make a meal off broiled ape, in the woods of America."

"A brother of our groom," observed Reginald, "a soldier, has assured me, that while at Panama, or rather Guaitemala, he frequently relished a slice of monkey for his dinner, but that the tremendous heat of those parts gave a disrelish for animal food in general, and while there he existed principally on a fruit called the alligator-pear—a vegetable that does not resemble our pear otherwise than in shape, but contains a creamy pulp, which, scooped out and seasoned with salt, pepper, &c., forms a light pleasant mess."

"There is no doubt," I returned, "that vegetable substances are the most appropriate diet in warm climates, where they are most abundant—where the cocoa-nut feeds, clothes, and shelters a family, and the product of the Talipot palm feasts a country. The Kroomen tribe, inhabiting Cape Palmas, in Africa, feast on a little palm-oil and a few

yams. How startling is it to turn from these simple, unpretending repasts, to the lavish magnificence of a modern civic banquet, where one hundred guineas may be concentrated in a single dish, and where caviare and botayne, and other innumerable helps, are called into request to provoke appetite, and add to the zest of the most choice wines; or to look back on the surpassing luxuriousness of a Greek or Roman supper, where the carving, entrusted only to a master-hand, proceeded to the sound of ravishing melodies; and when Lucullus, reclining in his grand Apollo-chamber, fared sumptuously beyond conception on cates and liquors, which for rareness and sapidity have, peradventure, never been excelled!"

We had now returned within sight of the Harringtons' gate. "Will you come in and dine with us?" inquired Reginald; "Papa will be so glad to see you."

"Make my compliments to him, but I cannot accept your invitation, inasmuch as I am engaged elsewhere to-day; and unless you could tempt me with the eastern delicacy of cucumbers stuffed with pearls, and one of the golden apples of the Hesperidum Horti for dessert, I do not feel that I should be justified in setting aside a prior obligation—even though you should tear my cloak from my shoulders, to employ a Latin expression for a very pressing invitation."*

"We must say no more, then," replied Annie, laughing, "but wish you a good appetite." And with mutual nods we separated, and I wended homewards along the slippery road, the thawed spots of which were now glazed over by incipient frost, whilst in the valleys and over the dim horizon were passing silently the white, downy folds of night's cold mist-veil.

CURIOUS TRANSMUTATION.—It is perhaps difficult to believe that common salt should be a chloride of sodium in the hand, and a muriate of soda in the mouth; but it is nevertheless true. Nor is it more incredible than the change which sulphuret of potasse undergoes by solution, the decomposition of which is rendered evident to the senses by the evolved sulphuretted hydrogen.

* "My rule in travelling is, to do without all superfluities. Wherever human creatures are to be found, I carry with me no eatables; what they can live on, I can, and if I do not like their food, it must be because I am not really hungry, and the remedy for that is to fast till I like anything."
—*Ida Pfeiffer's Voyage round the World.*

* "*Venulam mihi scidit*—he tore my cloak from my shoulder."—*Stuckius's De Convi.* lib. iv. cap. 2.

46—The Appendix. W. J.—The Appendix, or “the Tutor and his Pupils,” is to be placed at the end of each volume, as the separate paging shows.

47—Prices of Books. Evans, A Well-wisher, F. C. J., and several other correspondents, are informed that these cannot be given by us, without subjecting ourselves to the stamp office charge for advertisements. It is the business of publishers to make such matters known in the usual mode.

48—Chemistry, Physiology of Health and Disease, and Physical History of Mankind.—The several series of papers relating to these subjects have only been temporarily delayed, and will be immediately resumed. The Zoological papers are recommenced in the present number. Other new and important subjects are in preparation.

49—Mathematical and other Books.—“I should deem it a great favour if you would take the trouble to name a course of works on the application of Algebra to Geometry, and on the Differential and Integral Calculus.—F. C. J.”—It is our intention to commence, very shortly, a descriptive catalogue of the best books on all topics of interest to our readers. It will be divided into subjects, each of them so restricted in scope, that we may give it complete in a very small amount of space. We shall be glad to learn on what topics such information is most desired, so that we may commence with the most useful.

50—Movement of Camphor in Warm Water.—“It is a well-known fact, that if a small piece of camphor be placed in warm water, it will move to and fro in a very singular manner. I wish to know if you or any of your friends (through the medium of the *Family Tutor*) can inform me the reason of its doing so.—A Subscriber.”—If the circumstance be correctly stated, it is an interesting one, is quite new to us, and is worth studying. Camphor is an organized substance of a peculiar kind, and represents the volatile oils in a solid state. It is nearly insoluble in water. Possibly the heat of the warm water may develop some electrical action.

51—Combustion of a Wax Candle. W. H.—Moralists have compared the life of man to a “brief candle,” but Dr. Ure has investigated this comparison with scientific minuteness. Thus:—wax contains 81.75 parts of carbon in every hundred parts, and the combustion of these one hundred parts produces thirty-six parts of carbonic acid; consequently a wax candle will generate, per hour, about 375 grains of carbonic acid, or 800 cubic inches of gas. Now an average sized man develops and exhales from his lungs 1,632 cubic inches of gas per hour; thus the combustion of two ordinary wax lights deteriorates the air to about the same extent as the breathing of one man.

52—Measurement of Timber.—“I lately had a discussion with some of my neighbours about the measurement of timber. I would beg to suggest that you (or some of your numerous correspondents) would give the rules how to calculate the cubic contents of a given quantity of timber of different lengths, breadths, and thicknesses, in order to give the exact measurement of it, the same as when it is calculated in single pieces, which will much oblige an Inquirer.”—Ingram’s *Practical Mathematics* will probably give the information desired. Our correspondent, we presume, is aware there are different modes of

measuring the different parts of the wood-work constructed by joiners and carpenters. Framed joisting, for instance, is measured by surface measure—beams and transoms, by the cubic foot.

53—Greek Testaments.—“I wish to ask your opinion as to the comparative merits of two works, each of which have been strongly recommended to me by different friends, but both of which, being very expensive, I cannot afford to purchase. They are Dr. Bloomfield’s *Greek Testament*, in two volumes, and Mr. Alford’s *Greek Testament*, also, I believe, in two volumes. Being a theological student, and shortly to become a minister in the church of England, I am anxious to procure that which is likely to prove most serviceable to me, and of which the views are most sound and correct, according to the canon of popular opinion. I should be best pleased to hear your own opinion, if you have seen and compared them; but, if not, a reference to any work, or able review, in which I may find the judgment of an independent party upon both, will perhaps serve as well.”—W. H. W.—We are not personally acquainted with either. Perhaps some of our subscribers are, and will give us their opinion.

54—Rationalism.—If J. K. wishes to study the original German writings on this subject, he will have to enter on a vast field, the writers being so numerous. If he be satisfied with one or two individual statements of the case of the Rationalists, and of those opposed to them, he will probably find sufficient information in the following books:—*The State of Protestantism in Germany*, by the Rev. Hugh James Rose. London: 1829. *An Historical Inquiry into the Probable Causes of the Rationalist Character, lately predominant in the Theology of Germany*, by the Rev. E. P. Pusey. London: Part I., 1828; Part II., 1830; and the reply to the Rev. H. J. Rose’s work, on *The State of Protestantism in Germany*, by Dr. K. G. Bretschneider, translated by a Layman of the Church of England. London: 1828. But if such an impartial account of what Rationalism means as may be comprised within a few pages, will content J. K., he cannot do better than read the instructive paper on this subject in the *Penny Cyclopædia*.

55—Roman Antiquities. G. A., and others.—It may seem somewhat extravagant praise, to say that no better books can be desired for the dissemination of the knowledge of the men and things of antiquity, than those published under the superintendence of Dr. Smith, by Messrs. Walton, Taylor, and Maberley, but they deserve all that can be said of them in the way of commendation. They are the productions of the best scholars of our time, men who have made themselves familiar with the profound researches of the learned men of Germany, and who, while adding much from their own intellectual stores, have also known how to put their collected acquisitions into a popular shape for students of all classes. Thus we have first, *A Dictionary of Greek and Roman Antiquities*, in one large octavo volume; and then an abridgment, for the use of schools, from the same book, under the title of *Dictionary of Antiquities*, 16mo. Next, *A Dictionary of Greek and Roman Biography and Mythology*, in three 8vo. volumes; and then a work, in one volume, partly based on the former, entitled, *A New Classical Dictionary of Biography, Mythology, and Geography*, which occupies the same ground as Lemprière’s well-known work, but far more worthily. Lastly, there

is now in preparation, *A Dictionary of Greek and Roman Geography*, on the same large scale as the other two chief dictionaries, and which will also have its smaller representative. All these books are beautifully and profusely illustrated, printed on the best paper, and, considering their excellence, are moderate in price. The abridged or condensed series, indeed, may be called cheap.

56—Chemical Notation.—A pupil in *Chipping Norton*, refers to the chemical compound

Soda	—	—	—	38·55
Acetic Acid	—	—	—	61·45

100

and writes to know the meaning of the 38·55, and the 61·45, being 100. The best way to explain these figures, since explanation is needed, will be, perhaps, to dismiss the fractional parts for a moment—the ‘55 and ‘45—and to suppose that the other figures were 39 and 61, instead of 38 and 61; they would then mean, that if a certain quantity of the compound in question be reckoned as consisting of 100 parts in the whole, those parts, on analysing, are found to be composed of two articles, in the proportions shown by those two figures, which together make the 100. But the actual figures are 38 and ‘55, and 61 and ‘45, where the ‘55 and ‘45 represent respectively fractional parts of 100, that 100 being equivalent to one of the preceding 38 and 61. Thus on looking at the original statement, he will see that the 45 and the 55 added together make 100 fractions, or 1 to carry to the next denomination, which, added to the 61 and 38, make the whole 100. Therefore the compound is formed of 38, and 55 fractional parts of 1; and of 61, and 45 fractional parts of 1. In each case the total being considered as 100. It is obvious, that in reducing a compound to proportions, some figures for the whole must be first settled. Here these figures are, as we have seen, 100. Having given these explanations, let us add that a far better mode of representing chemical proportions is now adopted, and for which we are indebted to Liebig and Poggendorff. This method is fully explained in our first volume, pp. 267—270.

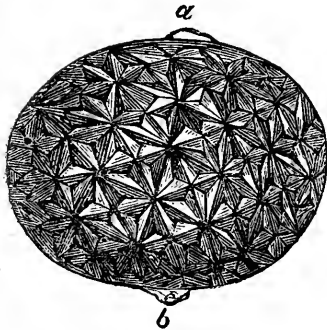
57—Geological Terms.—“I was glad to see you take up the subject of Popular Geology, having been interested lately in the subject, and read some books which were only partly intelligible, wanting explanation of technical terms. I must say, however, I am at as great a loss in perusing your three numbers of the *Tutor*, for I find not a single term explained. This, I need not tell you, is a great loss; for unless one procures an elementary work, there is no possibility of getting the desired information; and I conceive a Popular Geology, which you intend for young persons who have no other works to consult, should supply all the information required for the thorough comprehension of such an interesting science. I refer you to such terms as Oolite, Belemnite, Ananchyte, Lias, Shale, Gneiss, Mica Schist. I say nothing of other terms which can be understood by the derivation—that is, by a scholar—but which should still be explained for the sake of the English reader. You should give at once a Glossary of scientific terms. No dictionary can explain such as occur in this science, and most of the writers on the subject—even the most popular and interesting, such as Hugh Miller—

appear to imagine that all these terms are as familiar to the general reader as to themselves. It is therefore in your power to render many of these publications intelligible, and to create an interest in the public mind for this study, if you give proper explanations of every term—even of what may appear to yourself very plain—for the sake of the general, and therefore uninformed reader.”—A Subscriber.—We shall give a complete Glossary at the close of the papers referred to. As to the other topics of “A Subscriber’s” letter, which we have read with attention and respect, we must point out to him that *special instruction* is the essential characteristic of the *Family Tutor*. Its subscribers must be looked on as engaged in the serious business of education—not as merely desirous of obtaining such general information as the *Penny Magazine*, and other similar publications, have been accustomed to furnish; but he will find in our future numbers a greater variety of topics dealt with, and we shall endeavour to make the whole as interesting as is compatible with the objects of the *Tutor*.

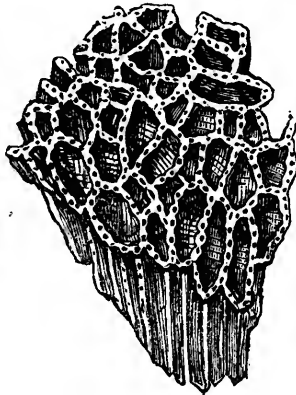
58—Stammering. J. S.—Persons subject to this malady, should study attentively the following points:—respiration, vocalization, enunciation, and articulation. We may illustrate our meaning by a few words on the first—respiration. Stammerers manage their respiration badly, even while most of them can speak freely in a whisper. They also fancy they have insufficient breath, but this arises from their attempting to speak on an involuntary inspiration. To speak firmly, the ribs must mechanically contract the chest’s cavity at the same time, and this they can only do when raised to the proper position by a previous voluntary inspiration. There is also a pain sometimes felt in the pit of the stomach, which, if not altogether owing to, is increased by attempts to speak on an involuntary inspiration. In both voice and speech, the production and modification of vocal sound depends on the laws of acoustics; while the adjustment of the various parts of the apparatus, which produce and modify the voice, depends on voluntary muscular movement. The one is mechanical, the other physiological. It is a curious fact, that mechanicians constructed speaking-machines, to imitate the human voice and speech, long before philosophers had determined how far speech is a mechanical result. It is more curious still, that the mechanician, Kempeler, excludes acoustics in his definition of a vowel, which he entirely deduces from the organs of the human mouth—thus forgetful alike of the circumstance that parrots can utter words, and that his own mechanism uttered certain vowels. The article on “Stammering,” in the *Penny Cyclopædia*, and a book on the *Philosophy of the Human Voice*, by Dr. Rush, of America, and sold by Chapman, of the Strand, we believe, will furnish J. S. with all the information he can desire, and may help him, if he perseveres, to cure himself of so annoying an infirmity. The writer of the article in the *Cyclopædia* gives a cheering hope of cure. He says, that the cause of stammering is purely functional, and that he and the late Mr. Thelwall effected many cures, by no other means than simply training the speech-apparatus. It appears there are few female stammerers, not, it is said, above thirteen out of every hundred. The proportion of stammerers to the population of Great Britain generally, is one to every 3500.

POPULAR GEOLOGY.

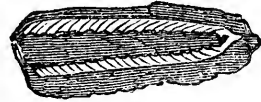
CHAPTER VI.—PRIMARY STRATA: CLAY SLATE, GRAUWACKE, AND SILURIAN SYSTEMS.—*Continued.*



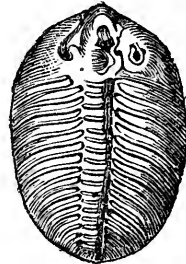
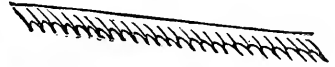
1. *Spænorites balticus*.



2. *Catenipora escharoides*.



3. *Graptolithus Murchisonii*.



4. *Ogygia (or Asaphus) Buchii*.

Earliest Living Things (continued).—Few persons, we imagine, can look at the extraordinary creatures shown in the above design, without something like a thrill of emotion, when they are informed these are among the *very earliest (known) forms of animal life*. One of the very oldest of all appears to be that we have placed first—the *Spænorites balticus*, which belongs to the family of Radiata. The mouth is at the upper side *a*, and a stem, rarely found with the fossil, extended from the opposite extremity *b*. It is found in the Llandeilo * rocks, in Wales. The beautiful chain coral (*Catenipora escharoides*) illustrates the general richness of the Silurian formation in the family to which it belongs. It is widely spread through Europe. The *Graptolites* are here represented by the *G. Murchisonii*, as found in the shales of the Silurian system. They are believed to be related to the genera *Pennatula* and *Virgularia*, and if so, were doubtless, like the existing species belonging to these genera, accustomed to live in mud and slime. Lastly, the trilobites appear before us, in the person of the animal named *Ogygia (or Asaphus) Buchii*. This family of crustaceans was to the Silurian seas what our crabs and shrimps, &c. are to the seas of modern times. Upwards of two hundred and fifty species of trilobites have been already drawn and described. They are supposed to have swam at the surface of the water, in the open sea, and near the coasts, feeding on their smaller marine companions; and to have been able, when themselves threatened with any unpleasant consequences, whether by way of retaliation or as merely an incident in the same

“ Good old plan,
That he should take who has the power,
And he should keep who can,”

to roll themselves into a sort of defensive ball. The mode of progression is doubtful. The animal may have had soft paddles, which were incapable of preservation, or it may have used the flexible power of its body to produce locomotion. Its eyes form a particularly interesting feature, both for their organization, and the use that an eminent geologist, Dr. Buckland, has made of them, in explaining the condition of the seas in ancient geo-

* Accidentally printed Dandeilo, at p. 68.

logical eras. There are two eyes, each consisting of 400 compartments, or spherical lenses, which are so placed on the surface of a cornea, projecting conically upwards, that they all look outwardly from the animal's head. These, then, are raised, so that the animal, from its position at the bottom of the waters, can see all around, without any hindrance from its own protuberant body; but their inward lines of vision do not cross each other, as that would have been an unnecessary waste of power—a striking instance of the combination of fertility and economy that Nature so often loves to present unto us. Wealth, not waste, seems ever her motto. But the trilobite has been a means of important special instruction to the geologist. It told Dr. Buckland that the air, the light, and the sea-waters of the incalculably distant eras when the trilobites flourished in such amazing profusion, were essentially as they are now. For, first, if the deep waters had been turbid, such delicate organs of vision would have been useless; second, had the atmosphere differed from its present condition, the rays of light would have been also affected to a different result, and then we should not have found, as we do find, the eyes of existing crustaceans agreeing with the older crustaceans in question; and, thirdly, as to light itself, it is certain that the mutual relations of light and optical vision were essentially the same then as now, because the essential organizations of the eye in both periods is the same—a happy instance of sound logical and geological deduction!

Already, the distinction with which we are familiar, between the vegetable feeders and the Carnivora, or flesh-eaters, existed. The trilobites belonged to the latter class.

Condition of the Earth's Surface.—The chief characteristics of the surface of the crust during the existence of these systems, are shown pretty clearly by the differences of the strata. The clay slates must have been compressed from fine clayey soil into their present state, by waters of immense depth, but undisturbed by agitation. The sand and gravel of the Grauwacke (or gray rock) reveal the effects of rivers, and of the action of the sea upon its shores. The lime of the Silurian rocks tells us of the long labours of the coral builders, in raising the beds and reefs of limestone.

Igneous Rocks associated with the system.—Certain igneous rocks, not already mentioned, are generally associated with these aqueous rocks. They are serpentine, porphyry with greenstone, and other varieties of trap; the last we shall speak of in connexion with the volcanic rocks. Serpentine derives its name from the contrasts of colour that it often exhibits, and which distantly resemble the skin of some serpents. It usually contains much magnesian earth. The term porphyry is derived from a Greek word, signifying purple, and is as old as the days of Pliny, when it was applied to a reddish rock, containing crystallised felspar, brought from Egypt, and used in ancient Sculpture. It is now applied to all unstratified rocks in which detached crystals are embedded.

Scenery of the Transition Rocks.—The finest examples of the scenery produced by the transition rocks—as those under notice are called by some geologists, who consider them to occupy a place between the primary and the secondary—may be found in Wales, where, says Professor Phillips, supported by granite, and mixed with igneous masses, the slaty rocks of the English lakes rise to more than three thousand feet in height, and present a variety of outline, and intricacy of combination, which, in connexion with clear lakes and considerable waterfalls, leave to Switzerland little superiority! But they also extend generally over the world, sloping away from the sides of its principal mountain ranges.

Uses.—Some of the uses of the rocks of this formation hardly need to be mentioned, they are so well known. The clay slates supply our schools with the popular instrument of instruction in writing and cyphering, and the roofs of our houses with the best of coverings. Slate boxes are also beginning to be used in our conservatories, and the slate itself for a variety of other ornamental purposes. The Silurian rocks contribute their help in the shape of flag-stones for our street pavements; whilst the limestones furnish various ornamental marbles. But the metals they give us are still more important. Indeed, these rocks generally are (with the exception of the lead and iron-stone of the carboniferous system) the richest of all others in this respect, as they

include gold, silver, tin, lead, copper, &c., which are found in metallic veins traversing the clay-slate.

SECONDARY STRATA.

The Carboniferous System:—The Old Red Sandstone, or Devonian Rocks.

Name, &c. of the System.—This system includes the *Old red sandstone*, the *Mountain limestone*, and the *Coal measures*; from the latter the group derives its name—*coal-bearing*.

*The Old Red Sandstone.**—Upon the hollows and elevations of the undulating bed of the sea, around the ranges of the primary rocks, produced by the later phenomena of the first great geological era, the secondary strata began to be deposited. We have already seen how the matter to be deposited was ever in process of accumulation, from the wear of the substance of the primary rocks, and have spoken sufficiently of the various agencies and influences that operated to cause transport, deposition, and condensation. The entire thickness of the secondary strata, which comprise the *Old red sandstone*, the *Mountain limestone*, and the *Coal measures*, was small as compared with the thickness of the preceding rocks, and extended over much less space. The reasons are obvious; the one sprung from the causes at work through the whole globe, the second from causes that concerned chiefly only those parts of the primary rocks that were gradually exposed to atmospheric and other action. But, if of less depth and extent, they are of far greater variety and number, in the alternations of the lesser strata, and are, as a whole, greatly superior in all that concerns the development and support of organized beings. More and more, too, do they seem to approximate, in the circumstances of their formation, to the existing phenomena of external nature.

Name, &c.—It looks, at first, as though nature had receded, rather than advanced, in the earliest of the secondary strata, the *Old red sandstone*, a rock called old to distinguish it from another—the *New red sandstone*, which is found above the *Coal measures*; denominated *Red* on account of the colour it exhibits in *Devonshire*, where it is most abundant; and hence the other name for the system—the *Devonian*. In this, there is a decided decrease in the number of organic fossils, and what little vegetation had struggled into existence during the preceding systems, is scarcely any longer to be found. The reasons appear to be that volcanic action was renewed with additional violence, which not only rendered the atmosphere and the raised lands unfit for plants, but disengaged vast quantities of mineral matter—the peroxide of iron—which being dissolved in the seas, rendered them less fit generally for the support of animal life. It is this iron which gives the peculiar colour to such large portions of the sandstone rocks.

Geographical Developments of the Old Red Sandstone.—The chief developments of the system in this country are in *Devonshire* (where it overlies the *Silurian*, and flanks the transition-hills, as these again flank the primary ones), in *Cornwall*, *Wales*, *Herefordshire*, *Shropshire*, *Worcestershire*, *Scotland*. In *Russia*, it extends over a space as large as *Great Britain*. The whole of the northern part of *Scotland*, from *Cape Wrath* to the north flank of the *Grampians* (which are granite and gneiss), have been described

* The paragraph at the bottom of page 67, in our table of British strata, should have been printed thus:—

Carboniferous, and Mountain Limestone:—

Yoredale rocks, &c.

Lower or sand limestone, &c.

Alternating Limestone, &c.

The Old Red Sandstone:—

"Conglomerates and Limestones," &c.

"Coloured Marls," &c.

Tilestones, &c.

By the accidental omission of the words "*Old red sandstone*," and the non-indentation of some of the succeeding lines, the paragraphs do not exhibit their meaning clearly.

as consisting of a nucleus of granite, gneiss, and other similarly formed rocks, set, as it were, in a sandstone frame. The flat position of the strata partly causes this great surface extension: the earlier rocks are highly inclined. The thickness of the system in parts extends to ten thousand feet.

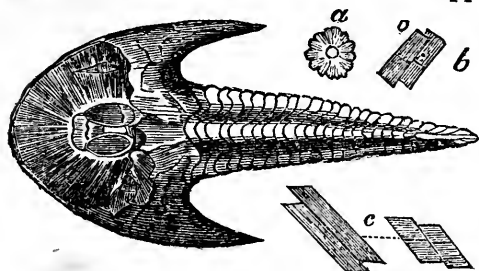
General Characteristics.—The sandstone is one of the most clearly developed of all geological systems. Where it exists in flat strata the scenery is uninteresting to the eye of the lover of the picturesque, though the farmer finds there a soil light and fertile; but where the sandstone rises into mountains, there is a marvellous change. The hills are less high and abrupt than those previously formed, but are more lofty and varied than those of later date. There is a constant change of view. All the peculiarly charming incidents of a natural landscape—such as gentle undulations, deep glens, and woody recesses—arise, from time to time, to the eye of the traveller.

Composition.—The sandstone varies in composition from a fine-grained hard rock, that can be split into pieces for flag-stones and tile-stones, to a thick mixture or conglomerate of sand and pebbles, many of the latter being as large as a man's hand. Some calcareous beds are found in the system, consisting of an impure concretionary limestone, called by the country people cornstone. The colours include various shades, from red to grey, and from mottled purple and fawn to a creamy yellow. The mottled colour is chiefly observed in the sandy shales—a sort of imperfect sandstone—that belong to this system, and which are found alternating in thin layers with the sandstone. The whole are evidently littoral depositions—that is, they were deposited by the sea-shore. Many of the strata present to our eyes as plainly the ripple marks made by the waves of unimaginable centuries ago, as those which the wanderer by the seaside of to-day sees on the sand of the beach, and which are yet wet from the waters of the last tide. The lower, or grey series, in which the traces of the primary mica are to be found, is the sediment of calm waters. The sandstone and conglomerates owe their position and strata to the action of currents and aqueous agitation. The yellow beds were only deposited when once more all was quiet in their vicinity.

Vegetable Life.—There are no certain evidences of land plants during the Devonian era. Of marine ones, fuci appear to have been the chief. These must have grown in a higher temperature than exists where they are now found—a proof of the more general diffusion of a tropical climate in these remote geological periods. On this head we shall have more to say when we speak of the Coal measures.

Animal Life.—No one even supposes there were any land animals during the Devonian era; all the things that breathed and moved had their home in the sea. Their general forms were not materially altered from those of the preceding Silurian era, but the species underwent a material change. Out of the eight hundred species comprised in the one era, only about one hundred passed on into the other. But to counterbalance this, there was a large development of fishes, and a general advance in the character of existing organizations. Among the species that were thus preserved, the coral builders may be specially named. They are so abundant in Devonshire, as to constitute entire strata—the beds of marble for which Babbacombe, Torquay, and Plymouth are famous. New species, of course, appeared—a monster trilobite, for instance, the Brontes, which was four feet long, and had lobster-like claws. The Cephalopods were now again largely represented, but with important changes in form. Fishes must have been plentiful in the Devonian seas. Upwards of a hundred species have already been reckoned. They were *all* cartilaginous—a striking feature of distinction from existing fishes, among which the bony-skeletoned are numerous, the cartilaginous few. These fishes were the destructives of their time, and kept down the too luxuriant population, as the Mollusca had done before them. Some are supposed to have been full thirty-six feet long. No less than nine genera of sharks have been discovered in the Russian Devonians. If we divide the Devonian fishes into the two orders, one of placoids—that is, having on the external covering irregular enamelled plates, laid edge to edge—and the other of ganoids, which possess regular enamelled

scales overlapping each other, we find that one only of the orders, the first, had existed during the Silurian era; hence, it is supposed that in that order the life of fishes may

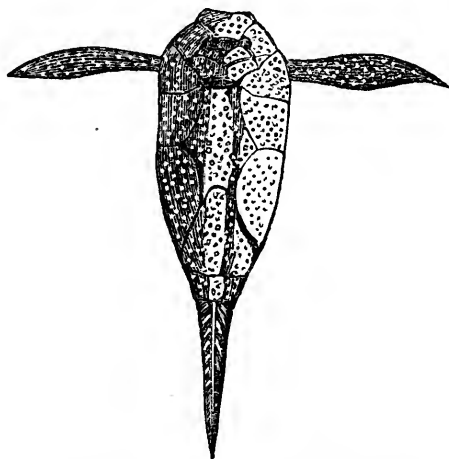


THE CEPHALASPIS LYELLI.—*a*. One of the scales of the head. *b*. *c*. Scales from different parts of the body.

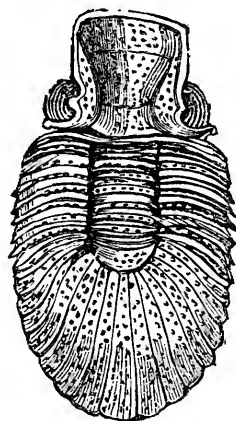
have commenced. Our engravings represent some of the more remarkable creatures found in the Old red sandstone. The annexed, (the *Cephalaspis Lyelli*), is from a specimen in the possession of Sir Charles Lyell, after whom, we presume, it is named, and from whose *Elements* we copy the design. "Buckler-headed," these animals are called, from the strange shield that covers the head. To look at it, one would suppose the saddler's or cheesemonger's cutting-knife would be a still more suitable term. Strong as this creature was for resistance, he was weak

indeed for active movement—the only organs suitable for that purpose being a range of very small fins.

These fishes (the *Pterichthys*) derive their name from their wing-like appendages, which they are supposed to have erected when threatened by an enemy, in the hope, probably, of frightening him off by such an un-fish like apparition; or, if that failed, of



THE PTERICHTHYS.—Upper side, showing mouth.



THE BRONTES FLABELLIFER.

being used as a weapon of defence. The tail is presumed to have been the organ of motion. These winged fish are as numerous in, and characteristic of, the Old red sandstone, as were the trilobites of the Silurian era. But trilobites remained and flourished in the Devonian era also. We give an engraving of one, (the *Brontes Flabellifer*), in which, it is to be observed, the head is not quite perfect. Its outline should be wider and rounded. The parts missing in the fossil specimen here represented were, perhaps, softer, or thinner, and so decayed, or were broken away.

Igneous Rocks associated with the Devonian.—The same igneous rocks that we have mentioned as being associated with the aqueous masses of the Silurian system, were also associated with the Devonian, with certain additions, such as amygdaloid, a trap rock, in which are imbedded almond shaped minerals—hence the name. The "toad-stones" of our peasantry are varieties of amygdaloid, and have obtained their appellation from the marking and colours resembling those of a toad's skin. Granite is no longer found in intimate connexion with the latest formed rocks: a proof that the granite era—that is to say, the time when granite was being constantly formed below, and heaved up on high, had passed away.

Trap, and its connexion with the system.—Without at present entering upon the subject of the volcanic rocks to which trap belongs, it is necessary to point out what is meant by the term. This is derived from the Swedish *trappa*, a stair, and expresses a peculiarity of the trap rocks, that they often rise in large tabular masses, one above another, like steps. When granite ceased to be upheaved, trap appears to have taken its place. And so we find that the rocks that upheaved the Devonians were trappean, or volcanic. The tremendous power that could thus raise immense portions of the earth's surface, appears to have been quiescent during the time of the deposition of the Old red sandstone, and then, as though the time had come for which it waited, to have burst forth, scattering new mountain ranges over the earth, against the sides of which was to begin once more the work of material progress; in the deposition, of yet a new strata—the mountain limestone.

Uses of the Devonian Rocks.—The uses of the Devonian may be thus summed up—tile-stones for our house-tops, and flag-stones for our foot-pavements, from the lower strata; building stones, of moderate value, from the red and yellow strata; stones for macadamising, from the trap; and agates and other precious stones from the amygdaloid variety of the latter. At the hill of Kinnoul, near Perth, there is a rock of this kind full of fine specimens.

The Mountain Limestone

Consists, in great part, of what was once life.—Perhaps there is no fact in Geology so utterly beyond our power to realise even in idea the truth of, as the formation of the mountain limestone, which is found in our country eight hundred yards deep, almost its entire substance being the remains of animal life; we can in many instances trace distinct relics of shells, corals, and crinoidea, to the extent of three-fourths of the mass. Need we say, after this, what an astonishing development of life must have characterised the present era, and left such evidences of itself!

Position, Geographical Distribution, &c.—The mountain limestone is found sometimes in beds, divided by layers of argillaceous matter, or of calcareous sandstone and shale, and surmounted often by the millstone grit of the north of England. At other times we find it flanking or even crowning the trap hills, in masses of enormous size, when it has been likened to a coral reef surrounding the island which formed its base. Although generally the Coal measures are above the mountain limestone, beds of coal, of the harder and less bituminous kind, called anthracite, descend, as it were below the great mass, and occasionally alternate with the various strata composing the limestone. On the other hand, the limestone seems to ascend beyond its own proper limits, and to alternate with the greater coal beds, and with sandstones, shales, and ironstones. The words mountain limestone, are applied directly to the thick masses that are found beneath the Coal measures.

Caverns, &c.—A noticeable peculiarity of this limestone, is its tendency to divide into rents, or "backs," as they are called, which are perpendicular to the line of stratification, and into other partings which are parallel with the same line. Caverns are frequent; the most magnificent caverns and grottos of the world are found in this rock—those of Derbyshire, for example.

Decided Development of Land Plants.—At last land plants begin to be visible in the earth, now represented by the mountain limestone, for it was unquestionably a terrestrial vegetation that was gradually transformed into the thin seams of coal found in the system; this fact, the great characteristic of the carboniferous group, will be better dealt with in detail, when we reach the Coal measures.

Its Animal Life.—The animal life is still marine. The corals are now of large size, and exhibit a very marked advance upon those of previous eras. For instance, in the Silurian rock, the corals were chiefly of a sessile kind, that is, sitting or supported in some way or other on or above the ground; but in the mountain limestone, many of

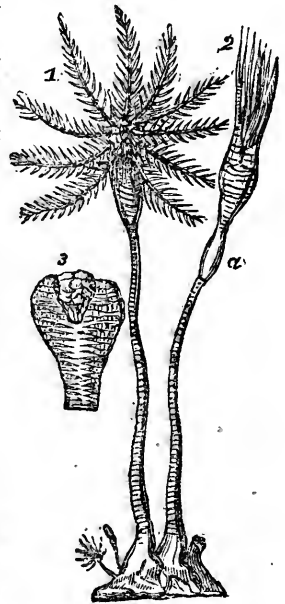
them are free independent animals, able to rove at their pleasure, and unlike any before or since existing.

The family of the encrinites or crinoids—the stone lilies—is very remarkable. “We may judge,” says Dr. Buckland, “of the degree to which the individuals of these species multiplied among the first inhabitants of the sea, from the countless myriads of their petrified remains, which fill so many limestone beds of the transition formations, and compose vast strata of entrochal (expressive of the *wheel*-like joints of the stem of the animals) marble, extending over large tracts of country in Northern Europe and North America. The substance of this marble is often almost as entirely made up of the petrified bones of encrinites as a corn-rick is of straws. Man applies it to construct his palace and adorn his sepulchre, but there are few who know, and fewer still who duly appreciate the surprising fact, that much of this marble is composed of the skeletons of millions of organized beings, once endowed with life and susceptible of enjoyment, which, after performing the part that was assigned to them in living nature, have contributed their remains toward the composition of the mountain masses of the earth.” Let us present a portrait of one of the members of this noticeable family: we cannot, perhaps, select a more interesting example than the *Apiocrinites Rotundus*.

It is here shown as restored from the mutilated fossils, and greatly reduced from the natural size. In *Fig. 1* we see the animal with its fingers open, ready to catch any of the smaller fry that might come within their grasp; whilst in *Fig. 2* we behold them shut, while, possibly, the process of digestion is going on in the remarkable stomach revealed in *Fig. 3*. The thickened part marked *a* shows that an injury to the stem has been repaired. This animal was fixed at the bottom of the sea, but could reach a considerable distance around it, through the flexure of its wonderful stem, of which we will speak presently. Others were able to float singly through the water; and yet others were accustomed to attach themselves to floating pieces of wood, &c. The stem is composed of joints, often called wheelstones, and also St. Cuthbert's beads, as they were used in monkish times, upon strings, as beads for a rosary. Hence the lines—

“On a rock by Lindisfarn
Saint Cuthbert sits, and toils to frame
The sea-born beads that bear his name.”

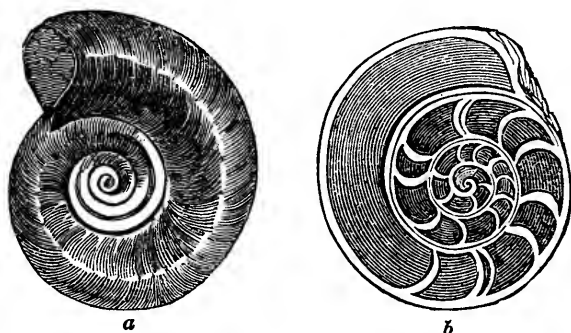
“Each of these joints presents a similar series of articulations, varying as we ascend upwards through the body of the animal, every joint being exactly adjusted to give the requisite amount of flexibility and strength. From one extremity of the vertebral column to the other, and throughout the hands and fingers, the surface of each bone articulates with that adjacent to it with the most perfect regularity and nicety of adjustment. So exact and methodical is this arrangement, even to the extremity of its minutest tentacula, that it is just as improbable that the metals which compose the wheels of a chronometer should for themselves have calculated and arranged the form of the teeth of each respective wheel and that these wheels should have placed themselves in the precise position, fitted to attain the end resulting from the combined action of them all, as for the successive hundreds and thousands of little bones that comprise an encrinite, to have arranged themselves in a position subordinate to the end produced by the combined effect of their united mechanism, each acting its peculiar part in harmonious subordination to the rest; and all conjointly producing a result which no single series of them, acting separately, could possibly have effected.”*



APIOCRINITES ROTUNDUS.

The shell-fish of the mountain limestone are also exceedingly numerous, and

present many curious and gigantic forms; and we may conclude, from their superior development as regards their predecessors, that their ocean home had already experienced a more genial temperature. It is further clear, that calcareous matter must have abounded in the water, to supply the material of which so large a part of their bodies consists.



EUMOPHALUS PENTAGULATUS. *a.* Exterior view. *b.* Section showing chambers.

In this animal, which abounded in the sea during the era of the mountain limestone, the shell internally is divided into chambers, and the animal is supposed to have retreated at different periods of its growth from the compartment previously formed, and then to have cut off all communication with it.

The fishes of the era now grow to a gigantic size, and in some cases resemble reptiles so strongly that they have been called Sauroid fishes—from the reptile class, Saurians. Teeth have been found belonging to them four inches long—terrible instruments for the humbler neighbours who were destined to perish beneath their operation. We know the nature of these fishes' food perfectly, for their excrements—coprolites—have become fossilized; and we see mixed up with the latter, fish scales and bones. And if there be something startling in this kind of familiar glimpse of the life of such distant eras, the feeling is increased when on close examination we can even perceive the unmistakeable traces of the actions of the intestines, in the convoluted form of the coprolites.

The Uses of the Mountain Limestone are important. Valuable building stone is obtained from the sandstone beneath the mountain limestone, and from the millstone grit. The mountain limestone itself is our great storehouse for that most valuable article—lime. The encrinal beds already spoken of furnish an extremely pretty marble, in which, as in a picture, may be seen the various members of individuals of that interesting and abundant family. The ornamental spars of Derbyshire are well known: they belong to the mountain limestone. This rock also contains the principal lead mines of our country. With the lead, silver and gold in small quantities are not unfrequently associated.

MARTYRS.—The Mohammedan law distinguishes several different descriptions of martyrs. This honourable title is given to the soldier who dies in fighting for his faith, or on his way to do so, or who dies almost immediately after his having been wounded when so engaged; to a person who innocently meets with his death from the hand of another; to a victim of the plague, who does not flee from the disease, or of a dysentery; to a person who is drowned; and to one who is killed by the falling of a wall or any building. It is said that the souls of martyrs, after quitting their bodies, reside, until the day of resurrection, in the crops of green birds, which eat of the fruits and drink of the waters of Paradise.—*Lane's "Arabian Nights."*

FAMILIAR LECTURES ON
CHEMISTRY.LECTURE XXIV.—THE ATOMIC THEORY.
THE POPULAR METALS: IRON.

IN resuming this series of papers, let us pause a moment to look back over the subjects that have already engaged attention during the first two volumes. They comprise—the nature of chemical force; the laws of definite proportions, and of chemical equivalents; the number and names of the elementary bodies; description of the chief of these bodies, and of the various compounds into which they enter with each other and with acids, metals, &c. What now remains, let us ask, to complete (within the limits of our plan,) the entire subject of Inorganic Chemistry, and to enable us to enter on the far more interesting field of Organic Chemistry—that mighty and inexhaustible theme which relates to the mysteries of the structure of life in all its forms? Two subjects at once suggest themselves. The Atomic Theory, and the Popular Metals.

THE ATOMIC THEORY.

On this head we wish merely to add a few supplemental words to the remarks that have already appeared in connexion with “Definite Proportions,” vol. i. p. 58, and “Chemical Nomenclature,” vol. i. p. 267, to which topics, indeed, they belong as a sort of useful preliminary explanation.

The atomic theory, for the development of which we are mainly indebted to the late Dr. Dalton of Manchester, supposes that all bodies are capable of division into extremely minute atoms, called ultimate, as being no longer divisible. No one has ever yet seen such atoms; possibly no one ever will see them, they are so minute. The difficulty of bringing them to the test of the senses, may be judged by a single illustration. In a drop of blood so small that it would remain suspended on the point of a needle, it is calculated, on sound scientific data, there must be *three millions* of the disks or red corpuscles of which blood is composed. But are these disks ultimate atoms? By no means; they are like everything else we can touch by chemistry, or see with the most powerful microscope,

divisible by the agency of the former power into still more minute substances.

If we define any ordinary mass of divisible matter as a portion of space *not entirely filled with matter*, (and the phenomena of expansion by heat, and contraction by cold shows that the particles of matter are not in strict contact,) then we may, in contradistinction, define ultimate atoms as portions of space *entirely filled with matter*. Such atoms cannot be cut in two, for there are no openings into which even the most delicate instrument can penetrate; they cannot be crushed to powder or drawn out like wire, for both these operations mean a new arrangement of particles, whilst we have already reached the unit.

As to the qualities of the atom, it is believed to be spherical, since there is no known reason why a form should develop itself in one direction more than another; opaque, since transparency results from the passage of light through the nearest spaces that envelop the atoms; colourless, because colour depends on the action of light upon particles of matter; and, lastly, perfectly hard, as including no vacant space whatever, even of the minutest kind.

Thus, when a piece of iron is broken up into the smallest possible particles that we can take cognizance of by our senses, every particle is still iron, and every such particle is capable again of division into atoms, whose combination in masses depends upon the power of adhesion.

These atoms are perfectly indestructible. Not all the mighty changes and events we see going on in endless sequence before us, as, for instance, the waste of material substances by exposure, or their destruction by fire or of organic substances, by death and disorganization, can add to or take away from their number. No existing atom can be annihilated, no new one created; we can merely change the position in which atoms are connected with each other. And upon such changes depend the existence, and form, and qualities of everything we see, touch, or feel. It is upon this base—the atomic theory—that the entire fabric of modern chemistry is now in process of erection. We have thought, therefore, a few additional words would not be without use.

THE POPULAR METALS: IRON.

It is a fortunate circumstance for us,
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that iron, which is the most useful of all metals, is also the most abundant and the most widely diffused over the world. It is found in nearly every soil, and rock, and mineral, in the form of an oxide, that is, combined with oxygen; it is also found in great quantities as a sulphuret, or mixed with sulphur; it forms an ingredient of many mineral springs, mixed with carbon, hence called a carbonate; and even vegetable and animal structure contain it—the human blood, for instance, where it is believed to play an important part in the economy of the frame.

It is a curious fact, that iron is nowhere found in a native metallic state as forming a part of our own globe, though other heavenly bodies seem to have so plentiful a supply of the material on hand, that they can spare us specimens every now and then, in the forms of meteoric iron and meteoric stones. The origin of *aërolites* is yet an unsettled point among philosophers, although there is no doubt as to the view they generally favour. Four several theories have been advanced. The first attributes them to the action of some of our volcanos; the answer to which is, that no substance resembling *aërolites* has ever been found in or near volcanos; that they come from a height to which our volcanos could not project them; and then there is the horizontal motion they always exhibit during their course. The next theory supposes them to be formed in the atmosphere; to this Chemistry replies, that she knows of no materials in the latter from which such bodies could be formed; and then their immense size—in some cases thirteen tons weight—renders it palpably absurd to suppose that they could either be formed in—or projected from—the attenuated air that alone exists at the height from which they fall, with a velocity greater, at times, than even the earth moves in its orbit. The third hypothesis is, that they are projected by volcanic action from the moon, a body that, as is well known, shows in her features how she revels in the development of the volcanic force. Laplace calculated that a body projected from the moon with a velocity of 7771 feet in the first second of time, would reach us in about two days and a half. The last and more generally received opinion is, that the *aërolites* are independent bodies, moving in space, either as they were

originally formed, or as fragments separated from larger masses, and which coming within the sphere of the earth's attraction, fall upon its surface. Whilst, therefore, falling stars may be small solid bodies moving round the earth in very eccentric orbits, and which become ignited as they pass with immense velocity through the upper region of the atmosphere, the meteoric bodies which throw down stones with explosions, are probably similar bodies containing either combustible or elastic matter. This is Dr. Halley's view.

There was a time, and that not half a century ago, when all statements about stones falling from the sky were received as amusing examples of popular credulity. And but for the extraordinary fact already referred to, of the *aërolites* furnishing native iron—whilst our earth itself always presents it mixed with other minerals—men of science would have possibly remained long incredulous. They too often forget, while opposing every thing that seems to them opposed to the laws of Nature, that true and inflexible as the latter doubtless are, man—fallible man—can never be so sure that he rightly understands them, as to be able with safety to close his ears to statements of new facts, that he cannot reconcile with other facts with which he is already familiar.

Aërolites, when taken up, are generally exceedingly hot. They are mostly irregular, and of prismatic and pyramidal forms. They are covered with a fused black crust, like a metallic varnish. When broken, they exhibit numerous small grey roundish bodies, inclosed within a gritty substance, and interspersed occasionally with yellow spots. Wherever found, their composition is essentially the same:—iron, in a malleable state, or in that of an oxide, forms the great proportion, and is always combined with a small and varying quantity of the rare metal—nickel. Silica, magnesia, and sulphur, are the other chief ingredients: whilst in minute quantities there may be sometimes found, but not in the same specimens, the earths,—alumina, and lime; the metals,—manganese, cobalt, and chrome; with carbon, soda, and lastly, water. Their specific gravity is about 3.50. Whilst it is clear from their composition that they do not naturally belong to the earth, in which no similar combination can any—

where be found, it is of course equally clear, that, as they contain so few original elements, they suggest a fact of the very deepest interest, viz., that all the worlds that exist through space may be compounded of the same materials as our own; for whether *aërolites* were broken off from other worlds during the process of formation, or whether they were themselves formed under circumstances similar to those worlds, they certainly afford an affirmative answer to the question—Are there any other solid bodies existing in space at all like ourselves? And if there are some, the conclusion is very natural that all may be so. And thus Chemistry leads to the same truth as religion—God is *one*.

Among the largest of these bodies, may be noticed the mass of malleable iron that was found in Siberia, a gift from heaven, as the Tartars esteemed it, and who accordingly held it in high veneration. It was quite insulated, and resting on a slate mountain, at a great height. There was nothing to suggest that it could have been in any way a work of art of distant and unknown times, and it is totally different from any iron then or since known. It weighed 1,400 pounds, and was spongy in its texture. The iron was tough and malleable. The iron of our own mundane territories is found in the greatest quantity in one or other of the following combinations:—with oxygen, with oxygen and carbonic acid, and with sulphur, which last is not worked as an ore. The ores are thus divided:—1. Clay iron-stone, which consists essentially of carbonate of iron, mixed with carbonates of lime and magnesia in various proportions. 2. Red Hematite, which is peroxide or sesquioxide of iron. 3. The black, or magnetic oxide of iron, another highly interesting form, for to this belongs the loadstone: all of which we shall describe in our next Lecture.

The process by which the ore is made to give up its soluble contents may be thus described. The ores are placed in the upper part of furnaces, with layers between them of coal, lime, and sandstone. The coal gives out carbon, which reduces the iron to the metal state, while the sand and the lime act as a flux, and form a liquid slag (or dross), through which the melted iron drops towards the bottom of the furnace, where it is drawn off. The slag is also separately drawn off,

and on cooling, contains a compound of lime and magnesia with a little iron. Thus we have got our “pig” or cast-iron, which, however, is by no means pure. There yet lurks in it unreduced ore, and a certain amount of carbon combined with it, which it is desirable to get rid of. It is now at once more fusible and more brittle than pure iron. Exposure to the air in a melted state soon causes the carbon to be burnt off. Stirring causes the other impurities to rise to the surface, as slag or dross, whence, of course, it is removed. The metal now gradually becomes less fusible, and the heat is steadily increased, until at last with the strongest heat it becomes solid. While hot it is hammered, and is thus at once purified and rendered more dense. Even yet there remains some half per cent. of carbon, and the least possible trace of silicon. But this is good iron, and will stand the test, which is its ductility. Very pure iron can be drawn out into wire finer than the human hair, though, unlike gold, it cannot be beaten into thin leaves. Its strength or tenacity when thus attenuated, is wonderful. A wire little more than three-fourths of an inch thick, will support a weight of 550 pounds. No other metal can equal iron in this respect.

If absolutely pure iron be wanted, we must fuse the filings of iron already made nearly pure, with one-fourth their weight of black oxide of iron, and some green glass to act as a flux. There is also another way. Pass a current of hydrogen gas over pure oxide of iron, when the latter is at red heat.

Other properties of pure and malleable iron are, greyish white with a tint of blue in colour; susceptibility to high polish; combustibility when minutely divided, as we may see by sprinkling filings in the flame of a spirit-lamp; hardness at common temperatures, a quality that is increased by heating, and then suddenly cooling the iron, which, however, makes it more brittle; capability of fusion at intense heat, and of welding whilst in that state (that is, joining two pieces together, by hammering, into a perfect union); fibrous texture, and susceptibility to magnetic influence; for iron, or rather that form of it called steel, may be rendered permanently magnetic. It is worthy of notice that nickel, which is so often found in companionship with iron, on those supernatural journeys from the skies

of which we have spoken, is the only metal that is like iron in its magnetic properties. When heated to redness, this property disappears. A loadstone suffers the same loss, at a heat just below that of visible ignition. A steel magnet loses its polarity when submitted to the temperature of boiling almond oil. The specific gravity of pure iron is 7.7.

WATER GLEANINGS.

HARD water, if habitually drunk, is apt to injure the digestive organs, and the glandular and absorbent system. To this are attributed the goitres to which the inhabitants of mountainous districts are liable. "That which runs over gravel, is always hard." *To determine whether water be hard or soft*; that is, fit or not fit for domestic purposes.—To a glassful of the water, add a few drops of solution of soap in alcohol: if the water be pure, it will continue limpid; if it be impure, white flakes will be formed. *To make salt-water fresh*.—The distillation of palatable and fresh water at sea was effected by P. Nicole, of Dieppe, by simply causing the steam arising from boiling sea-water, in a still, to pass through a stratum of coarsely-powdered charcoal, in its way to the condenser, or worm-tube. *To make sea-water fit for washing linens at sea*.—Soda put into sea-water renders it turbid; the lime and magnesia fall to the bottom. As much soda must be put in as not only to effect a complete precipitation of these earths, but to render the sea-water sufficiently lixivial or alkaline. Soda should always be taken to sea for this purpose. *To make artificial sea-water*.—Take common sea-salt, two pounds; bitter purging-salt, two ounces; magnesia earth, half-an-ounce; dissolve all in six gallons of river-water. These, it is said, are the exact proportions and contents of sea-water, from an accurate analysis. *To make an artificial chalybeate spring*.—Dr. Hare says, if we place a few pieces of silver coin, alternating with pieces of sheet-iron, in water, it will soon acquire a chalybeate taste, and a yellowish hue; and in twenty-four hours flakes of oxide of iron will appear. Hence, if we replenish with water, after each draught, a vessel in which such a pile is placed, we may have a competent substitute for a chalybeate spring.—*Builder*.

REVIEWS OF NEW PUBLICATIONS.

Home Truths for Home Peace; or, "Muddle" defeated. A Practical Inquiry into what chiefly mars or makes the Comfort of Domestic Life. London: Effingham Wilson.

It is a great pity that household education forms so small a part of education generally. If education be valued for its effects on our own characters and lives, as it should be, where, we would ask, can it have greater scope for beneficial action than within that which should be its sanctuary—home. For this every one should be specially educated. The head of the family should know how to govern, firmly yet gently, and within proper limits. Its mistress should so know how to organize all household affairs, that everything may be done in the best manner and at the most convenient times that pecuniary or other circumstances admit of. The younger branches should know how to obey cheerfully, without experiencing the false emotion of shame. Servants should be so trained in early life, that they may do what is required from them in a manner satisfactory to themselves and their employers, instead of being, as at present they are, almost hopelessly ignorant of some of the chief matters with which they have to deal. Health, order, economy, amusement, culture—all these things ought to be carefully elaborated into settled principles, and to some extent into definite and fixed rules for action in every household; and what a scene of domestic enjoyment would not every fireside present were such the case! The authoress of the little book before us offers valuable aid to all who desire to walk in this path; and we desire strongly to recommend all those who have, or expect to have, families of their own, to hasten to secure so valuable an acquaintance.

The spirit of disorder and bad management is personified very happily under the name "Muddle," and her efforts are directed first to detect and expose what Muddle is, and then to defeat it. This is done with an unflagging vein of quiet humorous satire; although, in her love of

saying smart things, the teacher does not forget that her object is to convince, warn, and guide—not to repel. She, therefore, sometimes exchanges the satiric for a kindly tone, which occasionally even descends to a touching earnestness, occasionally rises to a high religious fervour. With these pre-fatory remarks, we need do no more than quote two or three passages, that may illustrate at once the style and tendency of the volume.

PICTURE OF DOMESTIC MUDDLE.

“*In a muddle*,’ the most valuable china will not only *‘fall down of its own accord’* (that, as we have seen, may be expected of it *anywhere*), but it will previously *climb up* to some tremendous elevation, that it may aggravate its own destruction by that of all the yet simple-minded and able-bodied crockery beneath, thereby multiplying tenfold injury and annoyance to its owners. In the same spirit, though in an opposite direction, useless, lumbering articles, *always kept* at the very top of the house, will get down any number of stairs, or flights of stairs, in order to seek out low company in the kitchen; or to endanger the life or limb of every inmate of the dwelling, by placing themselves, with unblushing effrontery, in a passage. Keys will shake off their rings and get out of your very pockets, to crawl beneath the hearth-rug or leap into the dust-bin. Pitchers, notoriously dry whenever you had approached them to obtain only ‘a drop of water,’ will find out the nearest pump, and there get filled ‘too full’—rather than lose an opportunity of watering the bed-room floors, as if mustard-and-cess salads were to spring up from the carpets. Cruets, salt-cellars, and decanters, mock the thoughtful housewife, who is ‘continually replenishing them’ by, as perseveringly, discharging their contents: whilst shirts and other garments, ‘put away on Saturday night, without a single stitch or fastening wanting,’ and naturally expected to be fit for wear on Sunday morning, will actually get up again in the dead silence of the night, and proceed to distant drawers and wardrobes, that they may enjoy the malignant satisfaction of pulling off each other’s strings and buttons.”

To give a general contrast to this picture would require greater space than we have to spare; but our readers may partly build up the idea for themselves, from this specimen of what the authoress’s whole would be. She is speaking of the absurdity of persons in moderate circumstances keeping a sort of state room, not to be used on ordinary occasions; and then continues with what we may call a description of

THE PARLOUR OF A SENSIBLE FAMILY.

“But whilst it is highly *dis-advantageous* to have a sealed or state apartment in a small but increasing family, nothing is more conducive to health, order, and convenience, than the regular occupation of *two living-rooms*—one for meals

and the more laborious employments of the day, the other for lighter duties, rest, and social intercourse, and especially for the amusements and enjoyments of the evening. Here, though no unsuitable extravagance puts every-day dress to shame—though chairs and sofa are evidently meant to sit upon, and tables, strong enough to lean against, are free for common purposes and common inmates—some of the luxuries or elegancies of life, keepsakes or curiosities pleasant to heart or sight, may find a fitting corner, or give a beauty and a language to the neatly papered walls. Here, though children may walk about in peace, and drop a bit of cake without ruining the carpet, they may receive their first lessons in the salutary restraints imposed by civilized society, whilst *certain* pretty things are shown to their delighted gaze, on condition that they do not *touch*. Here, their own more costly toys may be trusted to their own more tender handling, and here they will regularly expect to receive some extra pleasure connected with their best behaviour, and their *cleanest*, if not always their best dresses. Here, also, the piano, which, never being exposed to the damp of an *unaired* atmosphere, stands *wonderfully* in tune, will invite mamma to exercise her fingers, that her darlings may dance around her; and when, after their happiest hour, the little ones are safe and still in bed, and husband and wife are left together—when the modest but ample curtains are snugly drawn, and the fire burns cheerily and bright, and present certain love and happiness contrasts with former doubts and fears—here, whilst *habitual* order and refinement restore the exhausted spirits after daily toil and care, old tales will be related, old songs will be sung; and should any friend drop in to pass away an hour, or valued acquaintances accept a cordial invitation to form a larger party, the room, if rather crowded, will be full of happy people, fearless of injuring anything or anybody; and when they *must* go home, it will be to add to their pleasantest remembrances ‘a most delightful evening.’”

We must not omit, in conclusion, to give our readers a taste of the humour we have spoken of, which seasons as with a salt the wholesome, business-like character of her book. And as what we have quoted may generally be of more interest to those of our pupils who belong to the tender sex, in what is to follow we shall, we are sure, find the gentlemen equally interested, since it concerns their domestic sanctum—their study, or whatever else it may be called. Our authoress says, then, we gentlemen cannot bear to have our things meddled with, not even for the purpose of purification; and although we feel inclined to call out—a libel!—she speaks so pleasantly, and takes such respectful precautions not to offend the *genius loci*, that we cannot do better than consent to the compromise she offers. Thus she explains our love of dirt, and thus she proposes

HOW TO DEAL WITH THE GENTLEMAN'S STUDY.

"Who shall say, indeed, whether some latent but powerful instinct, kneaded into the composition of the first man, may not cause every man to entertain a kind of filial regard and veneration for the maternal dust from which he was primitively taken; so that, at certain moments, and during uncertain tempers, his natural affection for his mother may lead him to defend her from the aggressions of his wife. But, however this may be, the fact is beyond dispute, that almost all men, who are not 'Mollies,' exhibit a much greater preference for dust than dusters; and, consequently, every woman who wishes, (and most women do wish it,) that her mother-in-law and herself should have separate establishments, must go warily to work to dispossess her. Still, 'as too bad is too bad,' and 'there is a moderation in all things'—for which, by the way, neither Dust nor her mortal descendants are particularly famous—"things may get to such a height," and dirt may get to such a depth in the gentleman's own room, that the most discreet and indulgent housewife may find it imperative to interfere. Let her do so, then; and when her husband is in the best of humours, and the remainder of the house is in the most perfect order, and the day is particularly fine, and the moment especially propitious, and the wife is conscious of those talismanic charms which will 'bring a man to anything,' let her eloquently state the exigencies of the case, then humbly entreat, coax, flatter, or command him to care for his own most precious 'rattletaps'—subsequently entice, decoy, lead, guide, draw, carry (anything but drive) him from the stronghold of dust and cobwebs; and, immediately making all the concentrated energies of all the household to bear upon the conquered territory, let her give her husband's room a quick but thorough cleansing.

"Without such precautionary measures, and unauthorized by such express permission from her 'lord and master,' let no woman venture to bring cleanliness and order into the 'royal peculiar' she has founded. Above all, let her refrain from laying so much as a smoothing finger upon any of the legal or literary looking litters about, and that might seem in especial need of her arrangement. However strong the temptation to bring *Meddle* versus *Muddle*, on behalf of what she thinks should constitute her husband's comfort, let her not give way to it; it may be more than her head is worth to displace a single item; nor, if her head is worth a price at all, will she venture to attempt it—for, truly, if anything can justify a man for sometimes thinking of putting away his wife, it is, when, despite of continual entreaty and admonition, 'she is always putting away his things.'"

Discovery of the Cause and Cure of Cholera.

Rotherham: Samuel Easton.

THIS little pamphlet is written by a non-professional man, and announces an entirely new mode of dealing with this fearful disease. Having watched certain cases of cholera which ended fatally at Masborough, he studied the causes, and

became convinced that it was not Asiatic cholera, or English cholera, that was to be feared, but *Masborough cholera*—in other words, that the true causes of the evil were native, and at hand, however analogous they might be to the same disease elsewhere. He tried to find out these causes, and presently remembered that a large flood had occurred not long before; that the water had stayed some time in the very houses where the cholera cases afterwards happened; that this flood was followed by several hot days, which, he concluded, would cause the gases and putrified matter to rise into the atmosphere, be inspired by the persons on the spot, and so lower the temperature of the blood as gradually to destroy the heat necessary to vitality. Satisfied of the causes, he sought for a cure. Presently the thought suggested itself—if cholera be produced by inhaling damp, incombustible, and impure air, would it not be cured by an atmosphere directly opposite? He then remembered seeing at Staveland Gas Works, above a large mass of burning iron-stone, a clear hot fluid, or gas, which acted with considerable influence on the surrounding atmosphere; "and that moment," he says, "I knew I had made one of the greatest discoveries that the world had ever witnessed." He presently sought out one of the worst cases. Here is the author's account of what follows:—

NEW TREATMENT OF CHOLERA.

"I was directed to a young woman of the name of Elizabeth Walker, who was housekeeper to Mr. Furnace, miller. When I entered the room, she was as pale as death, great difficulty in breathing, and her body cold and damp. I said, 'This is only what I expected.' (This was the first case of cholera I had ever seen.) I then said to her mother—'Well, I can cure your daughter in ten minutes.' She said—'Whatever would you do?' I replied—'Only three simple things are necessary. 1st. Let us have a good bright fire; 2nd. The bed must be removed near it, and her face turned towards it to breathe the hot air; 3rd. A large supply of bed-clothes.' These orders were quickly attended to. On being placed before the fire, she fell asleep. I examined her about five minutes afterwards: a great alteration had taken place; the action of the lungs had considerably increased, colour had returned to the pale cheeks, and heat was gradually replacing the cold and damp which previously existed on the surface of the body. I said to her mother, 'It is all right; give her another five minutes.' I went down to look at some more, and returned in about the time stated. When I entered the room, she exclaimed, as she sat up in bed, smiling—'Mr. Ferguson, you have saved my life.' She said she should like something

to eat. On inquiring what she would have, she replied—'A cup of tea, with some fat ham to it.' Now this was the language of nature; it was the very thing she was in want of to keep up combustion in the system—for the hydrogen of the fat, when combined with the oxygen contained in the hot dry air which she was inspiring, would not only produce but continue combustion. This is seen to be the case in the common candle; the fat or tallow, being the combustible body, gives out hydrogen, and the oxygen of the air, which is the supporter when combined with it, produces combustion."

Three other cases were similarly treated, with similar results. The scientific explanation he proposes resolves itself into these points—the composition of the air we breathe, its injurious modification during cholera periods, and its reparation by the new process. Oxygen, as is well known, constitutes one-fourth of the atmosphere, the remainder being nitrogen. When the air is very dry, there is an excess of oxygen; when damp, a deficiency. He quotes, in passing, Liebig's opinion—"Excess of oxygen produces fever"—a disease which he considers to be the antipodes of cholera, and to be created by the very influences that cure the latter. He then explains why hot air acts so suddenly and efficiently, while medicines are so slow and tedious.

HOW HOT AIR ACTS ON CHOLERA.

"All solids and fluids of which medicines are composed, have to enter the stomach to be digested by the gastric juice, then changed into chyme, then into chyle, previous to being changed into blood. The reader will perceive the tedious process which medicines have to go through, before they can act upon the blood either for good or for evil. Let us now examine how air acts upon the system. It enters by the windpipe, operates direct upon the blood—changing its colour from a dark purple to a bright scarlet, and from what is called venous to arterial blood. This is caused by the absorption of oxygen, or vital part of the air, and the expulsion of a corresponding quantity of carbonic acid, or gas destructive to combustion. Without oxygen, the latter gas could not be expelled from the system, as the evolution of carbonic acid is always accompanied by a certain amount of heat, in the same manner as heat expels vapour from water. Therefore, when the body is greatly reduced in temperature, owing to a deficiency of oxygen in the atmosphere, it becomes man, by artificial means, to supply that deficiency; and I know of no means so simple, so certain, so powerful, and so speedy to effect this, as the one I have pointed out. It is like nature's steam-engine, every stroke of which admits oxygen and heat on the one hand, and, on the other, expels carbonic acid and other poisonous gases. And this action and reaction, continued for only a few minutes, completely clears the system of the one, and is replaced by the other;

so that the sufferer is immediately restored to perfect health."

It will be seen that the nature of the author's remedy belongs directly to the region of physiology, and involves few or none of the peculiarly professional points that are ordinarily included in the subject. For this reason we have thought an explanation of the views contained in the little tract may be interesting to our pupils, while it may possibly provoke discussion, at the same time, in other circles better fitted to decide on its practical merits.

CLASSICAL WORKS OF INSTRUCTION.

1. *The Iliad of Homer*, Books i. to viii.
2. *Histories of Titus Livy, of Patavium, from the Foundation of the City [of Rome]*. The first three books.
3. *The Andrian, Heauton Timorumenos, Adelphi, Hecyra, ana Pharmio, of Terence*.
4. *Juvenal, Satires* iii. x. xiii. and xiv. Compiled by W. C. Boyd, T.C.D.
5. *The First Twelve Psalms in Hebrew, with a Latin Version, &c., and a Grammar of the Hebrew Language*. By the Rev. W. Baillie, LL.D., &c. S. Machen: London & Dublin.

OF these books we may say, generally, they are characterised by the same qualities already noticed in our review of a former batch of books issued by the same firm. The reputation they have already attained in Ireland, is not unlikely to be the precursor of a similar standing in England. The three at the head of the list are all edited by the same gentleman—"A. R. Fausset, A.B., Scholar and Classical Senior Moderator of Trinity College, Dublin." The whole of the books are used, we believe, regularly in the academical course of the institution just named: a fact that in itself is sufficient to render unnecessary any prolonged commendation from us. In the *Hebrew Psalms*, the Hebrew itself is said to be given with remarkable accuracy—an important point, seeing what liability there is to error in the composition of type in a language with which printers and printers' readers are so little familiar. It contains a *Praxis* and *Grammar*. To Fausset's *Homer* have been added a *Synopsis* of Grote's *Homeric Theory*. Examination questions and other aids are liberally given.

THE BIRD TALISMAN.

AN EASTERN TALE.

FOR THE TUTOR'S YOUNGER PUPILS.

(Continued from page 146.)

THIS was the Hermit's letter:—

"To my dear Grandchild, whom I have never seen, but whom I love for her poor mother's sake,—I am rejoiced to hear that after so many troubles and dangers you are happy and in good hands. Perhaps the best thing for you is that you should remain where you are with your young friend; but if anything happens to prevent this, and you are again in want of counsel or assistance, beyond what your faithful parrot can give you, do not forget to send again to your affectionate grandfather."

The two little girls continued to live very happily together, and became more

and more attached to each other. The cadi and his wife were made acquainted with the princess's rank, and treated her with the greatest kindness and respect; but they told the two little girls to keep all the circumstances a close secret, for fear the wicked queen of Cashmere should hear of her, and renew her persecutions; and it was agreed that she should continue to go by her slave name Shereen. One day, as they were sitting at their work in the room of the mother of Zuleika, (for that was the name of the princess's friend,) the cadi came home from attending the king's court, and looked very grave and melancholy. His wife asked him what was the matter, and he said there was very bad news from Cashmere. It was reported that the king had suddenly died, and that the queen had proclaimed her little boy king, and had declared herself regent in his name. The little princess was very much shocked and



grieved to hear of her father's death, and ran out of the room to conceal her trouble, and Zuleika followed to console her. A few days afterwards, as the cadi's wife and the two little girls were sitting at the window, they saw a great crowd coming along the street, and when it came near, they perceived a grand procession of men in splendid dresses, with horses and camels, and in the midst of them, on a camel covered with embroidery, rode the ugly negro, Baboof, all over jewels and finery, and carrying in his hand a letter, wrapped in

cloth of gold. The princess was much alarmed at the sight of him, and hid herself till the procession had passed. When the cadi came home from court, he looked graver and sadder than before; and being asked by his wife what the procession was, he told her it was an embassy from the queen of Cashmere, who had sent a most insolent letter to the king of Lahore, claiming tribute from him, and, in case of refusal, threatening war. He said, likewise, that the king was very angry, and had torn the queen's letter, and thrown it on the

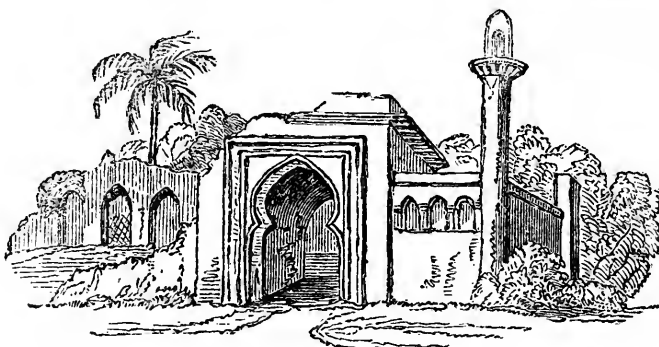
ground, and had ordered the embassy to depart, and that preparations were making on every side for war.

The cadi's wife often sat with the two little girls at the window, watching the troops marching through the streets to join the army; and the parrot was generally of the party, for though she was not so young as she had been, she was very fond of looking at the soldiers, and would ruffle up her feathers, and scream with delight at the noise of the drums and cymbals. One day, long after the departure of the last of the troops, as they sat looking up the empty street, the parrot said, in a melancholy voice, "I wish we could have some news of those charming warriors who are gone to fight in our defence." Then, suddenly brightening up, she cried, "How foolish of me to forget the daws! they will bring us news without fail;" and away she flew to find the daws, and sent them off to follow the army, and bring back news of the war. On the third evening after this, the two daws flew in at the window, worn out with fatigue and alarm; as soon as they had taken a little food and water, which the princess gave them, they told her that they had witnessed a great battle between the two armies, that the king of Lahore had been completely defeated, and his army dispersed, and that the army of the queen was in full march for Lahore, and would arrive the next day. The princess repeated all this to the cadi's wife, who was in the greatest grief and alarm, and who sent for her husband from the court, and told him what she had heard, and that it was by magic that she was acquainted with it, but she could not tell him more. At first he disbelieved her, and thought she had dreamt it, but seeing how alarmed she was, and knowing that she was a wise and good woman, he was convinced at last, and immediately went out to consult with the king's council what was best to be done. He did not come home till late at night, when he told his wife that the council had resolved, if the news were true, to submit to the queen's army, in order to save the city from destruction. The cadi's wife immediately went to the princess, and said to her—"The queen's army will be in possession of the city to-morrow. It will not be safe for you to remain here—we must send you away to some place of safety."

While the cadi's wife was talking to the princess—who was weeping with fear and with grief at having again to quit such kind friends—the cadi was hastily summoned to attend the king, who had escaped from the battle, and who was holding a council to consider of the terms of peace which were offered by the enemy. The council was a very short one, and the cadi soon returned, and told them that the enemy would grant them peace, and spare the city, on payment of tribute and a very heavy ransom. Indeed, the sum demanded was so great, that it could only be raised by a general contribution of all the gold, silver, jewels, and other valuables, including horses and slaves, to be found in the city. "We shall be reduced to poverty," said the cadi, "but we shall save our lives, and the enemy will leave the city in peace." "Oh, then, Shereen need not be sent away," cried Zuleika, "for she will be quite safe here." The cadi looked very sorrowful, and shook his head, and said that all the neighbours knew that his wife had bought Shereen for a slave at a high price, and she would be one of the first to be demanded in payment of the ransom; that the house would be searched, as well as every other house in the city, for valuables that might be concealed, so that they could not hide her in the house; and that there was no place of safety to send her to out of the city, which was surrounded by the enemy's soldiers. Having said this, the cadi went out, leaving them all in greater grief than before. But the old parrot, who had listened to all that passed, stepped down from her perch on to the princess's shoulder, and kissing her, bid her not cry, for she knew a safe place to hide her in. The two daws, she said, lived in a ruined mosque, near the back of the garden. This mosque had only one minaret left, at the top of which was a little chamber, where she would be quite safe; but of the stairs which led to it, the lower half had fallen down, and the only way to get up into it would be by a ladder. "If our friends," said the parrot, "will make a ladder of some of the silken cords of which I see plenty amongst the furniture of this place, the two daws will fly with it to the top of the minaret, and I can fasten one end to the bottom of the remaining stairs, and let the other end down to you; but the ladder must be made as light as

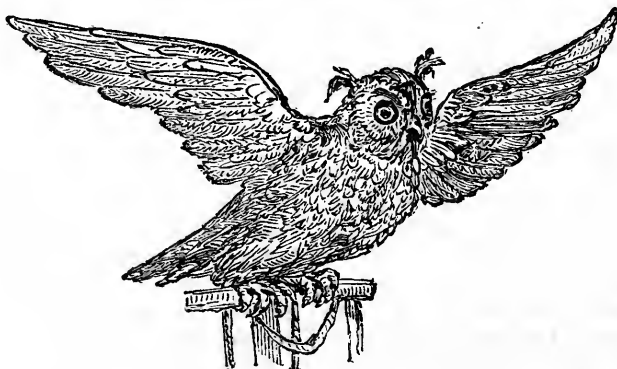
possible, or the daws will not be able to carry it." The princess repeated all this to the cadi's wife, and all three immediately set to work to make the rope ladder. The parrot took a little ball of twine in her claws, and flew up to the lowest of the remaining stairs of the minaret, and letting the ball fall down, while she held the end of the twine above, it unrolled as it fell. She then flew down after it, and picking it

up, flew with it to the princess, and showed her how much was unrolled, and that gave them the length necessary for the rope ladder. Zuleika sat in the window looking down the street, to give notice if the officers of the king should make their appearance to search the house; but they had many houses to search first, and by the time it grew dusk in the evening, the cadi's wife and the princess had made a ladder of silk-



cord, long enough and sufficiently strong to bear the princess's weight. As soon as it was dark, the cadi's wife and the two little girls went with the parrot secretly into the garden, and to a terrace overlooking the ground in which the ruined mosque stood, which was very near the garden-wall. They found a ladder in the garden, by which they reached the ground outside—the parrot having previously ascertained

from the daws, who were on the watch, that all was safe. As soon as they were under the minaret, the princess gave the rope ladder, which she had wrapped round a small stick, to the two daws, and told them to fly up with it. Each of them took one end of the stick in its claws, and tried to fly up; but, though the silk-cord was so fine that the ladder made a very small bundle, it was too heavy for the poor



birds, and they came fluttering to the ground with it. The parrot tried to help them, but she was such a clumsy flier, that she only got in their way, and made matters worse. They were all in despair, and were just going to return to the garden, when

they heard a frightful shriek just over their heads, and on looking up, they could see, against the faint light of the sky, a large bird fly to the top of the ruin, and perch there. It was an enormous owl. "The talisman! the talisman!" cried the parrot

—“give me the talisman !” and snatching the ring from the princess, she flew up and touched the owl with it, to his great astonishment. The old parrot then, with a most important voice, ordered the owl to take the rope ladder and carry it up to the top of the minaret, which he did, and then, bowing his great horned head to the parrot, asked if there were any more commands for him. “None,” said the parrot, “except to keep watch in this ruin at night, and give notice if any danger approaches;” and so the owl was dismissed. The parrot then managed to carry the rope ladder down the remaining stairs, and twisted one end of it firmly round an old nail in the wall of the staircase, and let the other end fall down to the ground. The princess and her two friends were standing below, and having taken leave of each other with many kisses and tears, she began to climb the ladder; and as soon as she was safe at the top, she pulled it up after her, and her friends returned to the house, leaving the princess in her new retreat, with her three birds. She could not see what sort of a place it was, but wrapped herself up in a cloak she had brought, and soon fell fast asleep.

(To be continued.)

LUMINOSITY.

AMONG the primitive range of the Fichtelgebirge, so named from its pine forests, in the centre of Germany, is a mountain called the Luchsberg. It appears as if composed of huge rounded fragments of granite, lying piled one upon another in various directions, leaving deep cavernous interstices between, of great extent and profound darkness, owing not less to the overhanging rocks, than to the tall pines that spring from their crevices. In the obscurer parts of these recesses, there is seen glimmering upon the damp soil, sometimes in considerable quantity, a number of luminous grains, of a colour resembling the greenish yellow of the chrysolite, but shining with a spontaneous lustre, somewhat between that of the gem and of gold. Its light varies from the moon-like character of the cat's eye, or the glow-worm, to the semi-metallic brilliancy of boracite. This very beautiful phenomena, to whatever substance it may

be attached, accompanies any quantity of the moist earth of the cave that may be gathered up in the hand; brought to the light of day it disappears, and the collector is left with a lump of worthless dirt in place of the seeming jewel. Nor will its beauty, though it return for awhile, prove of long duration, even when restored to its original darkness. The mystery is dispelled, the charm is broken, and, its hollowness once betrayed, the false light of the mouldering earth seems incapable of keeping up the delusion. The mysteries of mines and metals have, in Germany, been from old times associated with legendary tales of the supernatural power of gnomes and kobolds, who are supposed to guard them, and to punish in various ways the trespasses of avaricious man into their subterranean empire. What more mischievous, and at the same time morally appropriate revenge can they take upon the covetous intruder, than to entice him to a laborious search after gold, which, with an irony worthy of Mephistopheles, they cause to turn to dust in the very hands that have gathered it? Applied to avarice, the lesson is the same as that taught by the story of the Dead Sea apple as applied to pleasure; but the romantic humour of the German legend gives an additional zest to the truth of its moral. Luchsberg, the Lynx mountain, has an evident relation to the phenomena of phosphorescence; the name of the animal itself being probably derived from Lux, in allusion to the brightness of its eye; and so many Latin etymologies are discoverable among the languages of northern Europe, that this need not seem too far-fetched. After all, what is this luminosity? Is it phosphorescent moss, or minute fungi; or does the rotten wood itself become luminous, like decayed animal matter, without the intervention of a subsequently developed vegetation? Is not the light of the *ignis fatuus* the spontaneous produce of decomposition? Any experiments that can be made upon, or researches into the nature of any sort of spontaneous light, not the produce of combustion, are highly interesting, and may, possibly, be eventually of great utility in the hope of discovering the means of producing a sufficiently bright light for useful purposes without fire. *S.—Gardener's Chronicle.*

MANUFACTURE OF CANDLES.

THE art of candle-making is indebted for its existence to the eminent French chemist, M. Chevreul, who in 1811 began his researches into the nature and constituents of fatty bodies. He discovered that fat, instead of being a simple organic substance, as had been previously believed, was a salt, consisting of a solid animal acid (margaric) and an animal base (glycerin), the acid being the inflammable part. In 1814 he further discovered the existence of a liquid acid (oleic) existing in lard, and forming a chief ingredient in many fatty bodies. His researches were continued for several years; and in 1823 were given by him to the world in his well-known work. He has recently been presented by the *Société d'Encouragement* with a prize of 12,000 francs. The first successful attempt to employ commercially these scientific discoveries of Chevreul was that of De Milly, of Paris, who commenced manufacturing in 1832. De Milly employed a modification of Chevreul's process for separating the acids from the glycerin with which they are combined. Tallow is boiled up with thin cream of lime, which causes the acids to forsake the glycerin and combine with the lime; the acids are then set free by combining the lime with sulphuric acid, and the oleic acid is afterwards separated from the margaric by simple pressure. This is the process of "lime saponification." The obstacle to the success of this process was its expense, the margaric acid requiring nearly two-and-a-half times its weight of tallow to produce it. This obstacle was overcome by the firm of which Mr. Wilson is a member, and who, in 1830, became possessed of a patent for separating cocoa-nut oil into its solid and liquid parts. In 1831 the candle manufacture was freed from the Excise, and received in consequence a great impulse. The success of candles made from cocoa-nut oil was, however, not great, owing to their requiring snuffing; but it was discovered by Mr. James Wilson, while endeavouring to make cheap candles for the illumination on the occasion of the Queen's marriage, that from a mixture of the cocoa-nut stearine with stearic (pure margaric) acid candles were produced, which gave a beautiful light, and required no snuffing. These are

the well-known "Composite Candles." The next step was the purification of the fat acids by distillation, and the first suggestion of a method of doing this was made by Mr. George Gwynne, who proposed distilling in a vacuum apparatus similar to that used in sugar refining. He afterwards, in conjunction with Mr. George Wilson and Mr. Jones, carried out his idea into practice, by distilling in an atmosphere of steam, which gave the same results as the air-pump, but without its manufacturing difficulties, which were found to be almost insuperable. The process at present employed on the works of the company is briefly as follows:—"The raw material (at present palm oil) is exposed to a temperature of 350°, to the action of about 1-20 of its weight of sulphuric acid, which has the effect of driving off the glycerin, and of leaving the fat acids free: these acids, which are of a very dark colour, after being washed, are transferred to a still, from which the air is excluded by steam. The distilled material is subjected to pressure, first at the ordinary, and then at a high temperature, and the residue is the material of which the "Belmont Sperm Candles" are made. The process of distillation was commenced on a large scale at their works in 1844, two years before the opening of the factory of Messrs. Masse & Tribouillet, the first established for this purpose on the continent. Arsenic and wax were originally used by Messrs. Price & Co., to destroy the large crystals which were formed in their earlier candles, and which disfigured their exterior; but by pouring the stearic acid into the moulds at its congealing point, instead of at a high temperature, it was found that the crystals were no longer formed. As an example of the very large scale of the operations of the company, it may be stated that 800 miles of wick are continually being made into candles.—G. F. Wilson.

HIGH spirit in man is like a sword, which, though worn to annoy his enemies, yet is often troublesome in a less degree to his friends: he can hardly wear it so inoffensively, but it is apt to incommode one or other of the company! it is more properly a loaded pistol, which accident alone may fire and kill one.—Shenstone.

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

4. *Prosecution of the Medical Student's Education in London.*

ASSUMING that the two years of your sojourn with Mr. B. have expired, and that you are arrived in London at the commencement of the student's year, October 1st, for the purpose of selecting the school at which your studies shall be completed, let us pause to consider the grounds on which that choice should be made. In deciding this really important question, young men are commonly influenced by very insufficient motives. One goes to a particular school because his friend Dr. A., or Mr. B., was educated there; and we are all prone to regard too partially the *alma mater* which gave birth to and nourished our own youthful enthusiasm for science. Another is attracted by the name of a popular physician, or dashing operative surgeon, and hopes to shine by his reflected light. A third is, perhaps, determined solely by a lower scale of fees for lectures and hospital practice. We must be guided by reasons more substantial.

The main points you have to look to in making this choice, are facilities for acquiring an intimate and accurate knowledge of Chemistry, Anatomy, Physiology, Morbid Anatomy, and Pathology; and opportunities for efficiently attending hospital practice. A good chemical laboratory, commodious and amply supplied dissecting-rooms, an extensive museum, and able and zealous teachers, are the indispensable conditions of the one object; a well-arranged and regularly served hospital, in which clinical (bedside) lectures are systematically delivered, is essential to the other. Greater facilities for the former are often met with at the private Schools of Medicine, which, being less crowded than those attached to our large hospitals, the teachers are able to bestow more attention upon each individual pupil. And the best clinical instruction is not always attainable at the larger, and, on that account, most frequented hospitals, where the throng round a physician or surgeon of high repute is sometimes so dense that half the students are unable to hear what is said, much less

obtain a glimpse either of the professor or of the patient on whose malady he is descending. Another item of no slight weight to be taken into account, is the existence of a select medical library, in juxtaposition with the theatre, museum, and dissecting-rooms. On the whole, I am of opinion that it is better to enter to all the lectures at the same school, than to wander from one to another. Money will certainly be economised by so doing; but what will prove of far more consequence to you, much valuable time will be saved.

At some of these, now, highly organized establishments for medical education, *Scholarships* of from £20 to £50 per annum, held for one, two, or three years, are awarded to those pupils who pass the best examinations at the end of their first, second, or third winter. These are unquestionably fair inducements for entering to such institutions, provided that they are not deficient in more substantial qualifications, but they ought not to be permitted to bias our decision unduly. More than one school offers *free scholarships* to meritorious students, whose resources may have failed them before they have been able to accomplish their education. Prizes and honorary distinctions, also, are now conferred at all the metropolitan schools, as a stimulus to exertion, and materially contribute to foster a spirit of emulation favourable to industry. For full particulars of these attractive endowments, together with the terms of attendance at all these institutions, I must refer you to the student's number of the *Lancet*, which appears annually, for the especial service of the new men and their friends, on the Friday preceding the first of October.

I promised, in my last letter, to fill up more in detail the general outline I there gave you of the order in which your medical studies ought to be conducted. Unless taken up and pursued very methodically, their variety and multiplicity might bewilder and discourage you. It is no unfrequent occurrence, indeed, for young men from the country to be attacked by illness in consequence of attempting too much during their first session. I cannot do this more completely, and at the same time more concisely, than by quoting the very words of the Curriculum put forth by the Court of the Apothecaries' Company,

the examination for whose certificate, or license to practise, it is customary to undergo first. The course of study prescribed by this Board of Examiners, occupies two years and a half, and the subjects are distributed as follows:—

"FIRST YEAR.—*Winter Session* : Lectures on Chemistry; Anatomy and Physiology; Anatomical Demonstrations. ***Summer Session* :** Materia Medica, and Therapeutics; Botany and Vegetable Physiology; Midwifery, and Diseases of Women and Children.

"SECOND YEAR.—*Winter Session* : Anatomy and Physiology; Anatomical Demonstrations; Dissections; Principles and Practice of Medicine; Medical Practice. ***Summer Session* :** Medical Practice; Midwifery, and Diseases of Women and Children; Forensic Medicine; Practical Chemistry; Morbid Anatomy; Clinical Medicine.

"THIRD YEAR.—*Winter Session* : Dissections; Principles and Practice of Medicine; Medical Practice, Morbid Anatomy, and Clinical Medicine.

"Practical Midwifery may be attended to at any time after the conclusion of the first course of midwifery lectures."

Before they are admissible for examination, students are required to send in testimonials that they have strictly conformed to the above-cited regulations; that they have served an apprenticeship, of not less than five years, to a legally qualified apothecary;* of good moral conduct; and of being twenty-one years of age.

Candidates for examination at the College of Surgeons, in addition to the course laid down by the Court of the Apothecaries' Company, are required to produce certificates of having dissected during a third winter session; of attendance on a third winter session of lectures on anatomy and physiology; on two winter sessions of lectures on surgery; and on the practice of

* I must correct an error which appears in my last letter (No. xxviii. p. 100). Instead of advising the medical pupil "not to be articulated for more than two years," I intended to say that, "although articulated for five, he should not be bound to stay more than two years." The Apothecaries' Company still require a testimonial from every candidate that he has been apprenticed to an apothecary for five years; but a private arrangement is very commonly entered into by which the pupil is set at liberty at the end of two or three years, and allowed to repair to the schools of medicine.

surgery, at a hospital recognised by the Council, for three winter and three summer sessions: also, of being twenty-one years of age. The shortest period, therefore, in which the student can prepare himself for both examinations is three years; but he is, of course, not bound to confine himself to that space of time. Of this, however, more anon.*

Having, after careful scrutiny, joined the institution which promises the greatest advantages, your first step, after entering to the several courses prescribed by the examining Board, must be to register, personally, your cards of admission at Apothecaries' Hall, † where printed schedules will be furnished you, upon which your future testimonials will be filled up.

One word, before I proceed, on the subject of lodgings. In the immediate vicinity of some of the hospital schools, a limited number of commodious apartments are provided for the pupils; and one of the lecturers resides on the spot, for the express purpose of superintending the habits and conduct of their inmates. In short, a kind of collegiate establishment is attached to the school. Secure one of these berths if you can. The anatomical theatre and dissecting-rooms are close at hand, and you will find yourself one of a band of steady, working fellows, who do not vote regular habits a bore, and believe that a conformity thereto argues want of manly spirit.

All these preliminaries arranged, lose no

* A few data on the expense of what is popularly termed, "walking the hospitals," will naturally interest those on whom the cost of that *promenade* may fall; and the following estimate may be received as a fair approximation to the truth. Many of the London schools now offer to students the opportunity of attending the entire lectures and hospital practice, required by both Hall and College, on payment of a general fee, calculated at a rate somewhat lower than the sum total of the separate entries would amount to. This general fee varies from £70 to £100, and at some schools may be paid by instalments.

General fee for Lectures and Practice, say	£100	0
Purchase of Anatomical Subjects during three years	30	0
Books, Instruments, and sundries	21	14
Certificates of the Apothecaries' Company, for the country	6	6
Diploma of the College of Surgeons	22	0
	£180	0

† No card will be registered unless it be dated within seven days of the commencement of the course.

time at present, even in visiting such monuments of scientific industry and research as the Hunterian Museum at the College of Surgeons, but set to work at once and in earnest. By the omission of a single lecture on Chemistry, or Anatomy and Physiology, in your first session, the continuity of the subject may be broken; and one link lost, you will find it difficult to follow up the chain of facts upon the integrity of which all inductive science depends. Recollect, however, that no lectures will teach anatomy. You must take the scalpel in hand, and diligently investigate the structure of the human body for yourself. If dissection is necessary to the physician, it is doubly so to the surgeon; since, in this division of the profession no man can hope to excel who has not so familiarised himself, by actual and repeated inspection, with its minutest portions, as to see them distinctly "in his mind's eye," with all the parts in relation to them, when he commences an operation. By far the greater share of your time, therefore, during the first winter session, must be passed in the dissecting-room, To Chemistry, Anatomy, and Physiology, nevertheless, to meet the requirements of the Board of Examiners of the College of Surgeons, you will have to add the surgical practice of the hospital; but let it not, for this session, interfere too much with dissection. Whilst touching upon this subject, a hint on another very common misapplication of time will not be out of place. Dazzled by the skill and audacity of a brilliant operator, students often throw aside all other pursuits to run after operations. Although it is unquestionably important that you should see all the great operations performed, whenever the opportunity presents itself, as soon as you have become practically acquainted with the parts chiefly concerned in operative surgery, too much eagerness to witness its achievements arises from a false estimate of its comparative worth. Modern surgery is not the mere art of operating dexterously. Far more sound judgment and real science are shown in preserving a limb than in hewing it off, even when that can be accomplished in a few seconds. All our great surgeons, for the last quarter of a century—Astley Cooper, Brodie, Liston, Ferguson, have in this respect been eminently

conservative; and an operator of no mean celebrity was accustomed to remark to his pupils, that "it was with a sense of humiliation, all the resources of his art for saving a limb having been baffled, that he proceeded to perform an amputation." In private practice, moreover, although it is not the less incumbent upon him to be well prepared for such exigencies, when they do occur, for one surgical operation which a general practitioner may be called upon to undertake, he will have five thousand cases to treat, of what the hospital pupil, perhaps, will esteem as very common-place matters; but it is precisely because they are common incidents that they ought to possess an interest in his eyes. The management of wounds, sprains, burns, ulcers on the leg, and similar lessons, the puncture of abscesses, and the application of bandages, will be affairs of daily occurrence; and the young surgeon will find that his patients, not unreasonably, form their opinion of his general ability, by the manner in which he executes these minor, but by no means insignificant duties.

With regard to taking notes of lectures, some difference of opinion prevails. It was formerly a practice uniformly and indiscriminately recommended. Now, much less stress is laid upon it, even when it is not absolutely discountenanced, as it is said that what a student records in his note-book is seldom so firmly impressed upon the tablets of his memory. The apophthegm of Bacon contradicts this—"Reading maketh a full man, writing a correct man, and conversation a ready man." I should solve this *quæstio vexata* by saying, in all demonstrative lectures, such as those on Descriptive Anatomy and Chemistry, do not let the note-book divert your attention from the subject or experiment before your eyes; although brief memoranda of the principal heads of the lecture will certainly aid the memory in recalling what you have heard and seen, and methodise your reading thereupon afterwards. When listening to doctrinal lectures—those, for instance, on Physiology, or the principles and practice of medicine and surgery—notes will be most useful. You will also derive the greatest future advantage from records kept of all interesting cases and remarkable morbid appearances. If a medical society is connected with your school, by all means

attend its meetings, and contribute observations of your own, the discussion of which will accustom you to speaking in public, and will tend to make you, in Bacon's words, "a ready man." A common-place book at your elbow, on Locke's plan, for the entry of concise minutes of what you read, will further prove most valuable for future reference. Subjoined is the catalogue of elementary and other works, which I engaged to draw up for you in my last communication :

CHEMISTRY.—Fowne's Manual, Brande's Manual, Bowman's Introduction to Practical Chemistry.

ANATOMY.—*Descriptive or Special* : The Manual in use at your school, or Erasmus Wilson's Vade Mecum, illustrated; Quain's Elements of Anatomy, illustrated; Quain and Wilson's Plates; Cloquet's Plates; Macclise's Plates of Surgical Anatomy. *General Anatomy* : Bichat's, translated by Calvert; Hassall's Microscopical Anatomy.

PHYSIOLOGY.—Kirke's and Paget's Hand-book; Carpenter's Manual, both illustrated; Müller's Elements, by Baly; Hunter, on the blood; Thomson, on the blood and inflammation; Prichard's Natural History of Man; Cyclopædia of Anatomy and Physiology.

MATERIA MEDICA AND THERAPEUTICS.—Pereira's Elements; Royle's Manual.

BOTANY.—Lindley's Introduction.

MEDICINE.—Billing's First Principles; Williams's Principles; Cyclopædia of Practical Medicine.

SURGERY.—Liston's Practical Surgery; Fergusson's Practical Surgery, both illustrated; Samuel Cooper's Surgical Dictionary; Skey's Operative Surgery; South's Household Surgery, or Hints on Emergencies.

MIDWIFERY, AND DISEASES OF WOMEN AND CHILDREN.—Ramsbotham's Principles and Practice; Lee's Clinical Midwifery; West's Diseases of Infancy and Childhood.

MORBID ANATOMY AND PATHOLOGY.—Baillie's Morbid Anatomy, by Wardrop; Carswell's Pathological Anatomy; Rokitsansky's ditto (published by the Sydenham Society;) Cooke's Morgagni.

FORENSIC MEDICINE.—Alfred Taylor's Manual.

Many standard works on special subjects, which must nevertheless be read and digested, are of necessity omitted in this

list; for example, no mention is made of the writings of Astley Cooper, Abernethy, Lawrence, Latham, Louis, Prout, Brodie, Travers, Hope, Abercrombie, Paris, Johnson, &c. You will have, moreover, often to consult the Transactions of the Medico-Chirurgical Society, Guy's Hospital Reports, the Memoirs of the French Academy, and similar aggregations of individual experience; all of them rich mines, not alone to the student, but to the studious practitioner. Enough, however, for your present purpose—

"Messo t'ho innanzi: o mai per te ti ciba;"—

Lo! I have set before thee; for thyself
Feed now.

One final remark on reading. You may chance to hear, perhaps from the lips of a man for whose age and experience you feel great deference, some such opinion as the following;—"I never read; practice is the only school; observe for yourself." Let no fallacy of the kind sway you, by whomsoever it may be uttered. No individual, in the longest life, can hope to see a tithe of all that nature offers. Is it wise, then, to reject the accumulated observation of centuries, "The precious life-blood," as books are termed by Milton, "of so many master spirits, embalmed and treasured up on purpose to a life beyond life." Take rather the advice of common sense, and in the words of another philosophical poet recently lost to us:—

"Up, up, and drink the spirit breathed
From dead men to their kind."

Having furnished you with the chart whereby to steer, I need not pilot you step by step in your progress. Your safe arrival in the wished-for port must now depend entirely upon your own unremitting exertions. But when you have fulfilled all that is requisite to qualify you for appearing before the examining Boards, when you have carried off prizes and won scholarships—nay, even when you have passed your examinations with distinction, your acquirements in medicine and surgery will be but theoretical. As a student, however, you may proceed yet farther, and make your *débüt* as a practitioner—in surgery, by undertaking the office of dresser in the hospital wards—in medicine, by acting as clinical clerk to one of its physicians. These are opportunities which you ought by all means to embrace, time and circum-

stances permitting. A degree of responsibility attaches to such appointments, which compels a young man to be always on the alert, to have his knowledge at his fingers' ends. It brings out his natural resources, confers promptness and decision, and gives him confidence and self-possession, without which qualifications the most extensive attainments would be of little avail. Nerve, that *sine quâ non* to the surgeon, is a faculty naturally possessed by some in a higher degree than others; but it may be greatly strengthened by use and habit; perhaps it may even be acquired, to a certain extent, when deficient; albeit, Haller, a giant in anatomical, physiological, and medical science generally, is a remarkable instance to the contrary. In his *Bibliographia Chirurgica* he candidly confesses that although he had taught surgery for seventeen years, and had exhibited the most difficult operations upon the dead body, "he had never ventured to apply a cutting instrument to the living subject, through fear of giving too much pain." What a contrast does this great man's diffidence present to the rash assurance of those "daring fellows," whom Heister rebukes for practising surgery without a knowledge of anatomy, "to the great detriment," he observes, "of mankind, and to the disgrace of this truly noble art."

Should you be unable to obtain a dressership, there yet remains a substitute for it, which, if adopted and fairly carried into effect, will compensate, in some measure, for its loss. The expedient to which I allude, is the application of bandages, and the apparatus required for fractures and for the reduction of dislocations, upon a living model, paid to stand, sit, or lie for the purpose. Or, a couple of students may become patient and surgeon alternately, and practice *ad libitum* upon each other. Readiness and facility in the use of the stomach-pump may, in like manner, be attained by throwing water from one vessel into another, and withdrawing it by reversing the action of the syringe. Instead of first experimenting upon a patient, you may thus get over the awkwardness of the tyro, and gradually learn, at your leisure, and without risk, to execute with address and dexterity, many of the really momentous manipulations of surgery.

As the period for "going up" to Hall

or College approaches, besides the public examinations of their classes, conducted by the several lecturers, you will find it of material service to pass an hour or two daily in privately testing your capacity for answering questions on the various subjects you have been working at, by setting up some student, preparing like yourself for the same ordeal, as inquisitor, and putting him to the question in turn. *Steggall's Manuals* will assist you greatly in suggesting the range of questions which will be most useful; but draw your *replies* to them from the stores you have been industriously laying up for yourself, and do not rest satisfied with information obtained at second-hand. There are professional "grinders," who undertake this duty "for a consideration;" their classes, however, are usually composed of the gayer, idler men, who have neglected the only sure road to professional knowledge—steady and unwearied application to dissection, lectures, and hospital practice, and who think to compensate for their folly by thus learning, at the eleventh hour, to repeat by rote the answers to questions which are likely to be put to them. They may, peradventure, succeed in passing their examinations: but, alas! for their unfortunate patients, when they embark in practice. Alas! for their own painful position, if they have any feeling, when they see health and life sacrificed to their incompetence, and look back with unavailing remorse to time culpably wasted, and precious opportunities thrown away, which can never be recalled. I have no fear that such will ever be your sad case. Having laid your foundations broad and deep, upon sound general principles derived from enlightened theory, you will avoid, on the one hand, the hesitation and contracted views inseparable from mere routine practice; and, on the other, escape, for your patients and yourself, the dangers attendant upon self-sufficient empiricism. Armed at all points, even when called upon to treat cases which have never before come under your notice, you will not find yourself unequal to the emergency. Theory and practice will act and react beneficially upon each other; the one enabling you to interrogate, the other to interpret nature; and thus, as I told you in a former letter, your pupillage in her school will terminate only with your life. "Every man," says

Gibbon, "who raises himself above the common level, has received two educations; the first from his teachers; the second, more personal and important, from himself."

The general practitioner in the country, unlike his town brother, is compelled by his situation to rely more upon himself; he cannot shift the burthen and responsibility of an anxious case from his own shoulders, by calling in the aid of a physician or surgeon from whose dictum there is no appeal, at a moment's notice. He is not only what the appellation imports, physician, surgeon, and accoucheur, but is, likewise, the oculist, aurist, and dentist of his district. Whatever spare time, therefore, you may be able to snatch from more pressing duties, will be profitably bestowed upon the study of diseases of the eye, ear, and teeth, which are treated as specialities in the metropolis, the two latter having their own separate establishments. At the hospitals, moreover, for cutaneous maladies, and for club-foot and other deformities, you may make yourself acquainted with the nature and management of these troublesome affections.

It has long been the fashion for a large proportion of English students to pass more or less time at the continental schools of medicine. That certain advantages accrue from this custom is unquestionable. In the first place, it perfects them in the languages of the countries thus visited, and gives them the benefit of foreign travel, at all times esteemed an essential part of the culture of a gentleman, and more than ever so in these locomotive days. Paris, more especially, offers peculiar opportunities to the surgical student. Surgery and morbid anatomy are there very zealously cultivated. The facilities for practising operations on the dead body are superior to any he can meet with in England. The French hospitals well deserve his attention, particularly the two set apart for skin diseases and the disorders of children; and their museums contain much that is noteworthy. But rambles abroad are far better deferred until habits of application are formed, and your education is advanced. Then only are you in a position to appreciate fairly the comparative value of such novelties as may strike you. A very young man, even should he not throw aside study altogether,

allured by the amusements and spectacles of a gay capital, is apt to adopt exaggerated notions of all that he sees, and return home with a supercilious contempt for everything English, most unfavourable to his future progress.

In conclusion, I wish strongly to impress upon you, that whilst no man has ampler scope than the medical practitioner for realising Wordsworth's ideal of the "Happy warrior" in the battle-field of life—

"Who, not content that former worth stands fast,
Looks forward, persevering, to the last,
From good to better, daily self-surpass;"

if, actuated by no higher motives, he has chosen medicine merely as a means of arriving at wealth and a comfortable station in society, he runs no small risk of disappointment. "We have need of enthusiasm," exclaimed Abernethy, "or some strong incentive, to induce us to spend our nights in study, and our days in the sad and health-destroying observation of human diseases, by which alone we can hope to understand, to alleviate or to remove them. On no other terms can we be considered as real students of our profession; in no other way acquire the skill to confer that which sick kings would fondly purchase with their diadems." That skill is, however, often lavished, not alone without adequate reward—for no class is more liberal of its time and talent—ingratitude is too frequently the world's wages we reap. But let not this dishearten you; fortunately for yourself you appear to feel this enthusiasm, this love of the vocation you have determined to follow, for its own sake. Sustained by its influence, therefore, make up your mind to a life of labour and self-sacrifice, and you will "in no wise lose your reward." The humblest member of the medical profession, if imbued with its genuine spirit, may earn for himself the proud consciousness of being, in his sphere and generation, the benefactor of suffering humanity. Philanthropy must be his watchword, and his motto

"Non sibi sed toti genitum se credere mundo."

THOSE who complain most frequently of a lack of time, pass the most hours in utter vacuity. He has time enough who makes the minutes apparent by their effects.

CURIOSITIES OF ART.

MINIATURE MACHINERY.

MUCH skill and perseverance have been displayed by the ingenious in all ages in the construction of miniature objects, the purposes to be gained being minuteness of proportions with delicacy of finish. Veritable watches have been set in finger-rings; a dinner-set, with all its appurtenances, placed in a hazel-nut; and a coach and four enclosed in a cherry-stone. Beyond the mere training of the hand and eye to the accomplishment of delicate work, there can be nothing gained by such exhibitions of ingenuity; and were it not for this acquirement, we might safely pronounce all these tiny inventions as the offspring of ingenious trifling.

Cicero, according to Pliny's report, saw the whole *Iliad* of Homer written in so fine a character that it could be contained in a nut-shell; and Ælian speaks of one Myrmecides, a Milesian, and of Callicrates, a Lacedæmonian, the first of whom made an ivory chariot, so small and so delicately framed that a fly with its wing could at the same time cover it and a little ivory ship of the same dimensions; the second formed ants and other little animals out of ivory, which were so extremely small that their component parts were scarcely to be distinguished with the naked eye. He states, also, in the same place, that one of those artists wrote a distich, in golden letters, which he enclosed in the rind of a grain of corn.

Among the many curious works of art produced by the monks and nuns of ecclesiastical establishments, none have been so much admired as their fonts, real and in model. On these were often lavished vast sums, and all the ingenuity which the sculptor, carver, or worker in metal could command. The font of Raphael has long been known and admired; that executed by Acavala, in 1562, and presented by an emperor of Germany to Philip II. of Spain, may be considered, however, as the most elaborate of these performances. The model is contained in a case of wrought gold, and is itself of boxwood. The general design may be regarded as architectural, embellished with several compartments of sculpture or carving, consisting of various

groups of figures in alto and basso relievos. These display different events in the life of Christ, from the annunciation to his crucifixion on Mount Calvary. The groups are disposed in panels and niches on the outside, and in different recesses within. Some of the figures are less than a quarter of an inch in height; but though thus minute, are all finished with the greatest precision and skill; and what renders this execution still more curious and admirable, is the delicacy and beauty with which the back and distant figures and objects are executed. Though only twelve inches in height, and from half an inch to four inches in diameter, it is adorned with various architectural ornaments, in the richest style of Gothic, and also figures of the Virgin and child, a pelican with its young, six lions in different attitudes, several inscriptions, and thirteen compositions of basso and alto relievo. This work is said to be of unrivalled merit and beauty, and will bear the most microscopic inspection. It was offered for sale in England about thirty years ago; but we are ignorant of its after-destination.

We have read that Arnold, the celebrated watchmaker, constructed a watch for George III., which was set in a finger-ring; but this was nothing uncommon, for the Emperor Charles V., as well as James I. of England, had similar ornaments in the jewels of their rings; and this species of mechanism is sometimes witnessed, on a larger scale, in the bracelets of ladies. In *Kirby's Museum* notice is taken of an exhibition, at the house of one Boverick, a watchmaker in the Strand, (1745,) at which were shown, among other things, the following curiosities:—1st, The furniture of a dining-room, with two persons seated at dinner, and a footman in waiting—the whole capable of being enclosed in a cherry-stone; 2nd, a landau, in ivory, with four persons inside, two postillions, a driver, and six horses—the whole fully mounted and habited, and drawn by a flea; and 3rd, a four-wheel open chaise, equally perfect, and weighing one grain. Another London exhibitor, about the same time, constructed, of ivory, a tea-table, fully equipped, with urn, teapot, cups, saucers, &c.—the whole being contained in a Barcelona filbert-shell.

In 1828, a mechanic of Plymouth com-

pleted a miniature cannon and carriage, the whole of which only weighed the twenty-ninth part of a grain. The cannon had bore and touch-hole complete: the gun was of steel, the carriage of gold, and the wheels of silver. The workmanship was said to be beautiful, but could only be seen to advantage through a powerful magnifying glass.

A curious department of art, in which some nations, those of the East in particular, have signalised their ingenuity, is that of founding bells of enormous magnitude. Perhaps of all people, the Chinese manifest the strongest predilection for large bells. At Nankin, we are told, some were cast, about three hundred years ago, of such prodigious size, that they brought down the tower in which they hung: the whole building fell to ruin, and the bells have since lain on the ground. One of them is nearly twelve feet in height, and its diameter seven and a half: in figure it is almost cylindrical, except for a swelling about the middle; and the thickness of the metal about the edges is seven inches. From the dimensions of this bell its weight is computed at 50,000 pounds. Each of these bells has its respective name, as the *Hanger*, the *Eater*, the *Sleeper*, &c. Father Le Compte adds, that at Pekin there are seven other bells, weighing 120,000 pounds a-piece; but the sounds even of the largest are very dull, as they are struck with a wooden instead of an iron clapper.

The Russians, however, have surpassed all other nations in the size of their bells. With them bells form no inconsiderable part of public worship, as the length or shortness of their peals denotes the greater or less sanctity of the day. They are hung in belfries detached from the churches, and do not swing like ours, but are fixed immovably to the beams, and are rung by a rope tied to the clapper.

Some of these bells are of truly stupendous dimensions: one in the tower of St. John's church, Moscow, weighs not less than 127,836 pounds, being 40 feet 9 inches in circumference, and 16½ inches thick. It is used on important occasions only; and when it is struck, a deep and hollow murmur vibrates all over the city, like the fullest and lowest tones of a vast organ, or the rolling of distant thunder. In Russia, it has always been esteemed a meritorious

act of religion to present a church with bells, the piety of the donor being measured by the magnitude of his gift. According to this standard, Boris Godunoff, who gave a bell of 280,000 pounds to the cathedral of Moscow, was the most pious sovereign of Russia, until he was surpassed by Alexis, at whose expense a bell was cast weighing upwards of 443,000 pounds, and which exceeds in size everything of the kind in the known world. It has long been a theme of wonder, and is mentioned by almost all travellers. "The Great Bell," says Dr. Clarke, "known to be the largest ever founded, is in a deep pit in the midst of the Kremlin. The history of its fall is a fable; and as writers are accustomed to copy each other, the story continues to be propagated. The fact is, the bell remains in the same place where it was originally cast. It never was suspended. The Russians might as well attempt to suspend a first-rate line of battle-ship, with all her guns and stores. A fire took place in the Kremlin; the flames caught the building erected over the pit where the bell yet remained: in consequence of this, the metal became hot, and water thrown to extinguish the fire, fell upon the bell, causing the fracture that has taken place. The entrance to the pit or excavation is by a trap-door, placed even with the surface of the earth. We found the steps very dangerous; some were wanting, and others broken. In consequence of this, I had a severe fall down the whole extent of the first flight, and a narrow escape for my life, in not having my skull fractured upon the bell. The bell is truly a mountain of metal. It is said to contain a very large proportion of gold and silver. While it was in fusion, the nobles and people cast in, as votive offerings, their plate and money. I endeavoured in vain to assay a small portion of it. The natives regard it with superstitious veneration, and they would not allow even a grain to be filed off. At the same time, it may be said the compound has a white, shining appearance, unlike bell-metal in general; and perhaps its silvery aspect has strengthened, if not excited, a conjecture respecting the costliness of its constituents. On festival days peasants visit the bell as they would resort to a church, considering it an act of devotion, and crossing themselves as they

descend the steps. The bottom of the pit is covered with water, mud, and large pieces of timber; these, added to the darkness, render it always an unpleasant and unwholesome place, in addition to the danger arising from the rickety ladders leading to the bottom. I went frequently there, to ascertain the dimensions of the bell with exactness. No one, I believe, has yet ascertained the size of the base; this would afford still greater dimensions than those we obtained; but it is entirely buried. From the piece of the bell broken off, it was ascertained, however, that we had measured within two feet of its lower extremity. The circumference obtained was 67 feet 4 inches; the perpendicular height 21 feet 4½ inches; and its thickness, at the part in which it would have received the blows of the hammer, 23 inches. The weight of this enormous mass of metal has been computed to be 433,772 pounds; which, if valued at three shillings a pound, amounts to £66,565 16s. lying unemployed, and of use to no one."

Besides the above-mentioned bells, there are others which have long been regarded as curiosities, chiefly on account of their gigantic proportions. Thus the great bell of Rouen cathedral weighs 36,000 pounds; the brass bell of Strasburg, 22,400 pounds; "Old Tom," of Christ-church, Oxford, 17,000 pounds; "Peter" of Exeter cathedral, 12,500 pounds; the great bell of St. Paul's, London, 11,470 pounds; and the celebrated "Tom" of Lincoln, which is more than 22 feet in circumference, 9,894 pounds.

BOYS' EVENINGS.

MANY a boy ruins his character and wrecks all his hopes by misemploying the evening hours. School or business has confined him all the day, and the rebound with which his elastic nature throws these duties off, carries him often almost unawares beyond the limits both of propriety and prudence.

Besides the impetuous gush of spirits whose buoyancy has been thus confined, there are influences peculiar to the time which render the evening a period of special temptation. Satan knows that its

hours are leisure ones for the multitude, and then, if ever, is he zealous to secure their services; warily planning that unexpected fascinations may give attractive grace to sin, and unparalleled facilities smooth the path to ruin. Its shadows are a cloak which he persuades the young will fold with certain concealment around every error, in seductive whispers telling them, "It is the black and dark night come." How many thus solicited to come, "as a bird hasting to the snare, knowing not that it is for their lives," let the constantly recurring instances of juvenile depravity testify.

Parents acknowledge the evil here pointed out, and anxiously inquire, "What is to be done; can we debar our children from every amusement?" Boys themselves confess it, but plead in reply to the remonstrances of friends, "that evening is their only playtime, and that they must have some sport." It is certainly very proper that the young should have amusements. None better than ourselves are pleased to hear the lips of childhood eloquent with the exclamation, "Oh! we have had lots of fun." It seems like our own voice coming back in echo to us from out a long lapsed past.

Those amusements, should, however, be innocent; and innocent amusements are most easily secured and enjoyed at home. Here parental sympathy may sweeten the pleasures, and parental care check the evils of play, frequently intermingling its incidents with lessons of instruction. If parents would use half the assiduity to render an evening spent at home agreeable, that Satan employs to win to haunts of vice, they would oftentimes escape the grief occasioned by filial misdeeds, and secure a rich reward in having their children's maturity adorned by many virtues.

A word to boys concludes all that we would now say. Spend your evening hours, boys, at home. You may make them among the most agreeable and profitable of your lives, and when vicious companions should tempt you away, remember that God has said, "Cast not in thy lot with them; walk not thou in their way; refrain thy foot from their path. They lay in wait for their own blood; they lurk privily for their own lives. But walk thou in the way of good men, and keep the paths of the righteous."

SOLUTION TO THE ENIGMA.

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Your name is Ice-land, and peculiarly applicable it is to you. There are your mountains clad with snows, coeval with themselves, while not a tree, and scarce a shrub can rear its head among your vitrified cliffs. The same dreary rocks hide from the stranger's eye any patches of grass and straggling huts that may be in the valleys between; thus presenting only to his view the accumulated snows of countless winters, or the devastation of eternal fires. Fire and snow! Yes; though walled with icebergs, and roofed with glaciers, within your bosom fires kindled from time immemorial continue to burn. There is Hecla with its numerous progeny of minor volcanoes, which, at one time, darken the sky with clouds of scoria; at another, pour down their sides the slow lurid river of molten rock. Besides these, numerous boiling springs perforate your surface, the most remarkable of which called Geysers, are situated in your western parts. These strange phenomena have attracted many a traveller to your far-off shores, among whom was Sir John Stanley, who thus describes the action of the Great Geyser:—"When the basin is full,* the water heaves and boils violently from the expansive force of the steam labouring beneath. The ground now trembles, and a subterranean noise is heard. In an instant, the surrounding atmosphere is filled with volumes of steam, rolling over each other as they ascend, in a manner inexpressibly beautiful, and through which columns of water, shivering into foam, darted in rapid succession to the heights of 70 or 80 feet."

Parent of anomalies! who can fail to desire to visit thy wonders? But true, thou art far away, the solitary inhabitant of a bleak and dreary sea. Thou possessest none of those things that attract the merchantman—no spices, no pearls, no rich productions, or costly wares are thine to cause his frequent visit. But thou hast charms for the student of nature. During

thy short-lived, but resplendent summer, he can revel among thy lavas, and quaff the most refined pleasures around thy gorgeous fountains; and during thy long and dreary winter,* when the sun scarcely rises above the horizon, thy firmament is illumined with the most brilliant displays of magnetic light. And should thy visitants want the luxuries and comforts of southern climes, they are amply compensated by meeting a people, gentle, and peaceable, and strangers to crime.

THE CHARMS OF LIFE.

THERE are a thousand things in this world to afflict and sadden—but oh, how many that are beautiful and good! The world teems with beauty—with objects that gladden the eye and warm the heart. We might be happy if we would. There are ills which we cannot escape—the approach of disease and death, of misfortune, sun-dering of earthly ties, and the canker-worm of grief, but a vast majority of the evils that beset us might be avoided. The cause of intemperance, interwoven as it is with the ligaments of society, is one which never strikes but to destroy. There is not one bright page upon record of its progress, nothing to shield it from the heartiest execrations of the human race. It should not exist—it must not. Do away with all this; let wars come to an end, and let friendship, charity, love, purity, and kindness mark the intercourse between man and man. We are too selfish, as if the world was made for us alone. How much happier should we be were we to labour more earnestly to promote each other's good. God has blest us with a home which is not all dark. There is sunshine everywhere—in the sky, upon the earth—there would be in most hearts if we would look around us. The storms die away, and the bright sun shines out. Summer drops her tented curtain upon the earth, which is very beautiful, even when autumn breathes her changing breath upon it. God reigns in heaven. Murmur not at a being so beautiful, and who can live happier than we.

* This basin has an area of 56 feet by 52, from 4 to 5 feet deep. In the centre is a cylindrical tube 12 feet diameter and 70 feet deep, up which the water bursts at intervals of some hours. In the vicinity of the Great Geyser are some springs, however, that play incessantly.

* The arctic circle skirts the northern coast of Iceland. The inhabitants, therefore, have continued light for several days at Midsummer, as the sun sinks so very little below the horizon at midnight. The reverse is the case in winter.

59—Grammar.—T. C. asks which of the two forms of sentence is correct—"The government is very backward," or "The government *are* very backward." Both are correct. Government is a noun of multitude, and may be used according to the taste or convenience of the writer, either in the singular or in the plural.

60—Geology. W. J.—"I have for some time past been engaged in the study of geology, and am very anxious to get on in it. I have already collected a number of specimens, chiefly from the London clay, green sand, and chalk, amongst which are many duplicates. You approve of the plan proposed by T. H. of persons living in different localities exchanging specimens, and this I should be very happy to do. Can you furnish me with your correspondent's name?" [Perhaps the gentleman referred to will forward his name and address to us, as we have mislaid his letter.]

61—David Stirrat's Tables. H. C.—"I have read, your review of David Stirrat's *Tables*; and as I am, to use a hacknied phrase, 'A Constant Reader,' perhaps you will excuse me for observing that, in 1844, a little book was written by Eman Brinaugh, printed at Dudley, and published by W. Ensfield, 12, Strand, under the following title: '*Logarithms from a New Modulus that generates Logs. with the greatest rapidity, adapted to Commercial Calculations.*' The general rule given is—'First write the log. of the price, multiply it by the log. of the number, plus the increment, or minus decrement. *And it is done.*' At page 57 is the log. book, which consists of five tables, of exactly a similar character to those associated with the *Philosopher's Stone*. There are then given six rules, one of which is to find the interest for days, in these words. 'Multiply the number of pounds by the days, and the product again by double the rate per cent.; expunge the units and tens figures; the one-third of the remainder will be the interest in pence.' The whole is summed up in sixty pages, for which your humble servant paid at the rate of 1d. and one-fifth per page, consequently—

$$P \times \log N. = 6s. 0d.,$$

the amount of the sum out of which I was completely done."—[We have received another communication precisely to the same effect. The author of the pamphlet reviewed will, perhaps, favour us with an explanation. He may be assured this is a very necessary step for the satisfaction of all parties.]

62—Training Schools. A. M.—"I am desirous of entering an institution for the training of governesses and teachers, and shall feel greatly obliged if you will inform me which is the least expensive institution, and what are likely to be the expenses and time of training?"—Some of the following training schools will, perhaps, suit our correspondent. The Normal School of the British and Foreign Society in the Borough Road, in connexion with the British (Dissenters') schools, charge six shillings per week; the age must be from eighteen to twenty, and the terms of residence six, twelve months, and upwards. The Training Institution at Whiteland House, King's Road, Chelsea, in connexion with the National Society of (the Established Church), charges twenty pounds per annum, and the age may be from seventeen and upwards; the term of residence is from one to three years. The Home and Colonial School Society, Gray's Inn Road, have different charges

according to the class in which the pupil enters. The terms of residences for different classes are three months, six months, and one year or more. If she enters for a year or more, being above the age of seventeen, the payment is only £12 10s. per annum, if a government certificate of proficiency be obtained, or £17 10s. if not. There are also local training schools, as at Bishop's Stortford, for the diocese of Rochester, Derby for the diocese of Lichfield, &c. The Free Church of Scotland has a training school in Edinburgh, where three guineas are paid for each session, of about ten months, the students providing their own lodgings, &c. More detailed information may be found in Parker's *Family Almanack* for 1852, and which was reviewed by us in a recent number.

63—Shorthand. G.—"What is the best system of shorthand extant, and what books are published in connexion with such system? I want to be able to take notes of lectures, &c., and sincerely hope you will oblige one who is an earnest and studious pupil."—We have the same inquiry from other quarters. We should like to have the opinions of those who have really used shorthand for some time, and under circumstances calculated to test the particular system adopted. Meantime, the following explanation of one of the most popular systems—that of Taylor improved by Harding—may be useful. First, we give the alphabet:—

a	b	c	d	e	f	g	h	i	j
·	ρ	∩	/	·	\	o	q	.	o
k	l	m	n	o	p	q	r	s	
∩	6	σ	u	·	p	∩	7/	—	
t	u	v	w	x	y	z			
l	·	\	σ	∩	✓	—			

The vowels, it will be seen, are represented by points; the period representing *a*, *e*, *i*, the comma doing the same for *o* and *u*: each being further distinguishable by the position of the point. From the consonants, *c* and *z* are dismissed as needless; where the former has a hard sound, *k* is used; where a soft one, *s*. One character suffices for *f* and *v*, for *g* and *j*, and for *k* and *q*. Thus the consonants are reduced without difficulty or confusion to sixteen. The double consonants, *ch*, *sh*, *th*, &c., are marked by distinct characters. Again, single vowels are allowed to stand for words, as *a* for *an*. *The* and *and* are noted by commas, differently placed; *b* stands for *be*, *by*, and *been*, and so on. It is considered a good practical rule in learning, to test progress and efficiency by trying how rapidly the student can write the entire alphabet; to do it correctly four times in a minute, is good. The next source of gain is abbreviation, as by the use of single letters to mark the first and last syllables of words, *b* standing for *abs*, in absorb, for instance, *d* for *dom* in kingdom. It is known that these letters do not represent merely a letter, by their being slightly disconnected from the word to which they belong, while they are still so near that they cannot be mistaken for independent words. But whole

words, of length, are also expressed by a letter or by a mark—these are called arbitrary, and vary according to the writer's particular subject matter. Students of law, medicine, and divinity, reporters for newspapers, can each easily frame for themselves a plan of writing rapidly those special words which occur frequently to them, are difficult to write literally, and are not liable to be mistaken. Stenography is, in one respect, a sort of forerunner of the phonetic system. Like the latter, it writes only those letters that are actually sounded. We believe, in actual reporting, the shorthand writers go so far as to omit vowels altogether, or to include them only where they cannot be accurately added afterwards, as in the case of unfamiliar proper names.

64—Æolian Harp.—A "Well-wisher's" question relating to the phenomena of the Æolian harp, may be best answered by reference to a rare work, published many years ago by the learned Matthew Young, B.D., of Trinity College, Dublin, who in his *Inquiry into the Principal Phenomena of Sounds*, enters thoroughly into the subject. He says, "the phenomena of the Æolian lyre may be accounted for on principles analogous to those by which the phenomena of sympathetic tones are explained. To remove all uncertainty in the order of the notes in the lyre, I took off all the strings but one, and on placing the instrument in a due position, was surprised to hear a great variety of notes, and frequently such as were not produced by any aliquot part of the string: often, too, I heard a chord of two or three notes from this single string. From observing these phenomena they appeared to me so very complex and extraordinary, that I despaired of being able to account for them on the principle of aliquot parts. However, on a more minute inquiry, they all appeared to flow from it naturally and with ease. But let us consider what will be the effect of a current of air rushing against a stretched elastic fibre. The particles which strike against the middle point of the string, will move the whole string from its rectilinear position; and as no blast continues exactly of the same strength for any considerable time, although it be able to remove the string from its rectilinear position, yet, unless it be too rapid and violent, it will not be able to keep it bent; the fibre will, therefore, by its elasticity, return to its former position, and, by its increased velocity, pass it on to the other side, and so continue to vibrate and excite pulses in the air, which will produce the tone of the entire string. But if the current of air be too strong and rapid when the string is bent from the rectilinear position, it will not be able to recover it, but will continue bent and bellying, like the cordage of a ship in a brisk gale. However, though the whole string cannot perform its vibrations, the subordinate aliquot parts may, which will be of different lengths in different cases, according to the rapidity of the blast. Thus, when the velocity of the current of air increases so as to prevent the vibration of the whole string, those particles which strike against the middle points of the halves of the string, agitate those halves as in the case of sympathetic and secondary tones; and as these halves vibrate in half the time of the whole string, though the blast may be too rapid to admit of the vibration of the whole, yet it can have no more effect in preventing the motion of the halves, than it would have on the whole string, were its tension quadruple; for the

times of vibration in strings of different lengths, and agreeing in other circumstances, are directly as the lengths; and in strings differing in tensions, and agreeing in other circumstances, inversely as the square roots of the tensions, and therefore their vibrations may become strong enough to excite such pulses as will affect the drum of the ear; and the like may be said of other aliquot divisions of the string, in the same manner as standing corn is bent by a blast of wind; and if the wind be sufficiently rapid, it will have repeated its blast before the stem of corn can recover its perpendicular position, and therefore will keep it bent. But if it decays in rapidity or strength, the stem of corn will have time to perform a vibration before it is again impelled, and thus it will appear to wave backwards and forwards by the impulse of the wind. Those particles which strike against such points of the string as are not in the middle of the aliquot parts, will interrupt and counteract each other's vibrations, as in the case of sympathetic and secondary tone, and, therefore, will not produce a sensible effect."—We cannot recommend a more pleasing subject for mechanical ingenuity than the construction of an Æolian harp. And that we may tempt some of our pupils to try their hand at it, we will subjoin the following instructions, which are recommended by high authority. Let a box be made of as thin deal as possible, of a length exactly answering to the window in which it is intended to be placed, four or five inches in depth, and five or six in width. Glue on it, at the extremities of the top, two pieces of wainscot, about half an inch high and a quarter of an inch thick, to serve as bridges for the strings; and within side at each end glue two pieces of beech about an inch square, and of length equal to the width of the box which is to hold the pegs. Into one of these bridges fix as many pegs, such as are used in a pianoforte, though not so large, as there are to be strings; and into the other, fasten as many small brass pins, to which attach one end of the strings. Then string the instrument with small cat-gut, or first-fiddle strings, fixing one end of them, and twisting the other round the opposite peg. These strings, which should not be drawn tight, must be tuned in unison. To procure a proper passage for the wind, a thin board, supported by four pegs, is placed over the strings, at about three inches distance from the sounding-board. The instrument must be exposed to the wind at a window partly open; and to increase the force of the current of air, either the door of the room, or an opposite window should be opened. When the wind blows, the strings begin to sound in unison; but as the force of the current increases, the sound changes into a pleasing admixture of all the notes of the diatonic scale, ascending and descending, and these often unite in the most delightful harmonic combinations, producing

"A certain music, never known before,"

says Thomson, in his *Castle of Indolence*, who goes on describing the instrument as one

"From which, with airy fingers light,
Beyond each mortal touch the most refined,
The god of winds draws sounds of deep delight;
Whence, with just cause, the harp of Æolus is hight.

"Ah, me! what hand can touch the strings so fine?
Who up the lofty diapason roll
Such sweet, such sad, such solemn airs divine;
Then let them down into the soul!

* * * * *

"Wild warbling nature, all, above the reach of art!"

POPULAR GEOLOGY.

CHAPTER VII.—SECONDARY STRATA: THE COAL MEASURES.

Meaning of the Coal Measures.—Under this name we recognise that series of strata composed of coals, sandstones, shales (or mud), bands of ironstone, fire-clay, and impure limestone, which overlie the mountain limestone, and alternate with each other in irregular succession. Coal is the peculiarly distinctive and interesting feature of this series. At first, it only appears in thin seams at the bottom of the Coal measures, while the shales and sandstones, on the contrary, occur in thick beds. But as we ascend, the coal increases, and its companion, minerals, decrease, till, about the centre of the “measures,” we find the culminating point of the coal, for there it is at once found in the largest masses, and of the best quality. Above the middle, it again begins to decrease; and once more the shales, but of lighter colour than the previous ones, and the sandstones, prevail, until the next system is reached—that of the New Red Sandstone. A curious sort of regularity is often perceptible in the midst of the irregularities of the alternating strata. For instance, Professor Sedgwick tells us that, at Cross Pits, in the valley of Dent, Yorkshire, the coal seam under the twelve-fathoms limestone, is divided by a band of clay, half an inch thick, into two parts, with distinct mineral characters; and the same coal seam, with exactly the same subdivisions, has been found in the mountains on the opposite side of the valley, at the distance of three or four miles, measured in a straight line. This seems to prove that a bed, not more than a fraction of an inch thick, was originally continuous throughout an area probably several miles in diameter.

The Ironstone of previous formations, it will be remembered, occurred in veins, or merely as a thin colouring matter diffused through the whole structure of the bed in which it is found; in the Coal measures we find it in the form of an argillaceous carbonate, massed in thin layers, from an inch or so up to a foot thick, and in irregular nodules called septaria, from the nodules being divided into septa or partitions. The formation of the nodules is worthy of remark. Each consists of a nucleus of the remains of animals and plants, such as fish-spines, coprolites, teeth, scales, leaves, &c., round which the ironstone has been deposited, till the whole took the forms here represented, and which we borrow from Mr. David Page’s excellent *Rudiments of Geology*.



IRONSTONE NODULES.

In No. 1 we see imbedded a fragment of a plant; in 2, a fish tooth; in 3, a fossil coprolites, or excrement; and in 4, the internal divisions spoken of. These are formed by white carbonate of lime, which produces an effect somewhat resembling that of a beetle—hence the name among the peasantry, *the beetle-stones*!

Varieties of Coal.—Coal is found in various states, and by comparing the whole of these together, the circumstances of its formation are made tolerably clear. We will briefly review the varieties.

Lignite, or brown coal, or wood coal, (for it is known by all these names,) represents the first step in the process of the conversion of vegetable into bituminous matter.

There can be no doubt as to the origin of lignite, for the woody structure is still clearly to be seen in it. But our chemists have not been content with this evidence; they have made elaborate experiments, which show that if wood and vegetable matter are buried in the earth, exposed to moisture, and excluded from the external air, they decompose slowly, giving forth the white carbonic acid gas, thus losing some portions of their original oxygen, until, at last, the residue becomes lignite. It is by a continuance of this process of decomposition, and the accompanying discharge of carburetted hydrogen, (the gas which we burn in our shops and streets) that nature forms

Common Coal, which includes caking and cubic coal. Caking coal is so denominated on account of the tendency of its lumps to cake together during combustion, a quality, doubtless, owing to its highly bituminous nature. It contains forty per cent. of bitumen. This is the prevailing sort in the mines of Durham and Northumberland. Cubic coal is not so full of bitumen, and in breaking, divides into cubical shaped masses.

Cannel Coal is the most striking of all the strictly coal forms; and well we remember, in our younger days, when we lived in Devonshire, hoarding small pieces of it for the sake of its glossy, lustrous beauty; it makes most brilliant fires. Cannel coal contains about twenty per cent. of bitumen.

Jet is even more compact and lustrous. It is found in Saxony, and also in detached fragments in the amber mines of Prussia.

Anthracite.—Many of the fatal accidents that occur in mines, are owing to the escape of various inflammable gases from mineral coal. These gases include carbonic acid, carburetted hydrogen, nitrogen, and olefant gas. After a long period of continual discharge of this kind, the common coal ceases to present its original characteristics, and is, in fact, transformed into anthracite, known also by the names of blind coal, from its burning without flame; glance coal, from its shiny surface; culm, &c. The word anthracite is derived from the Greek *anthrax*—charcoal, which expresses the distinguishing quality of the thing, for this kind of coal is little else than a mineral charcoal. In composition it is closely allied to the ordinary black lead of our pencils. It is almost or entirely destitute of bitumen.

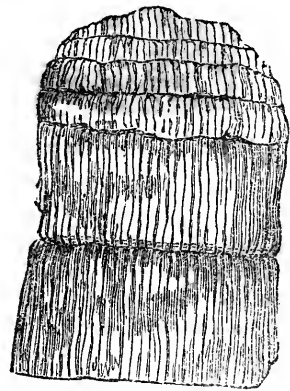
Formation of Coal.—While it is clear that the origin of coal is to be found in the decay and conversion of vegetable matter, it is a much more difficult question to determine the particular circumstances that contributed to its formation in the places where we now find it. Did the plants grow where the coal formed from them now lies? If not, how could such vast masses of vegetable matter have been brought together? Why, again, do we find the coal formations so continually interrupted by strata of shale, or sandstones? And when we examine the nature of the plants of the coal formation, as evidenced by their fossil remains, we shall find reason to ask another important question—What kind of climate could have existed in England, when such plants grew here, if they did grow here? The two theories that seem best to account for the various phenomena we shall mention. The first of these is suggested by the knowledge of what is constantly going on in our own time, at the mouths of great rivers, such as the Mississippi, which show us that enormous quantities of vegetable refuse, drawn away from the shores of the sylvan regions through which their waters pass, may be carried down to estuaries; there form into vast natural rafts, constantly increasing in size and density, until they sink to the bottom, and gradually become covered with a bed of sand or mud—the future sandstone or shale of some future coal measure, should other circumstances, similar to those that existed in former times, favour their conversion. It is very likely that this was one process of coal formation, if not the only one. Another is thus described:—Decaying vegetable matter forms peat; a subsidence of the earth beneath causes the peat to be overrun with the sea, and to be covered with sand or mud. Again, the land rises, new forests live and die, become peat, are depressed, and covered with a similar layer of sand or mud; and this process continually repeated, gives us, at last, the various alternating strata that we have already described. This theory receives some

support from the fact, that marine fossils are seldom found in the coal beds, which, if formed from decaying peat, would, of course, be essentially a terrestrial stratum; while they are abundant in the sandstones and clays that lie above and below the coal, showing that the coal stratum is preceded and followed by strata of an essentially marine character. The erect stems of trees, which are found with their roots fixed in the shale, in the natural place and position in which they grew, also show that they, at least, have not been transported from distant places.

A luxuriant Terrestrial Vegetation is, therefore, the great characteristic feature of the era of the Coal-measures; and there are no topics in geological science of deeper interest than the nature of this vegetation, and of the atmospheric and other influences that caused it to spring up in such apparently sudden and boundless magnificence. Already, the examination of the known fossils has resulted in our acquaintance with about eight hundred species, which are, or appear to be, chiefly gigantic developments of equisetums (or horse-tails), ferns, club-mosses, with us usually the lowliest of the vegetable family, but rising in the coal era to the most prodigious height, even to eighty feet; cacti, pines, and plants allied to the bulrush, cane, and bamboo, with a few palms, those princes of the vegetable kingdom, and tree-ferns. The fossils from which we learn these facts, mostly appear in the shape of broken leaves or branches, pieces of trees, trunks, and in ripe fruits, which are not in their original clusters, but individually separate. There are no traces of flowers—none, at least, that are quite to be depended upon. Occasionally, these plant-fossils appear in extraordinary profusion, and of almost inconceivable loveliness. Dr. Buckland has described a scene of this kind in words worthy of it. He says:—"The finest example I have ever witnessed is that of the coal mines of Bohemia. The most elaborate imitations of living foliage upon the painted ceilings of Italian palaces, bear no comparison with the beauteous profusion of extinct vegetable forms with which the galleries of these instructive coal mines are overhung. The roof is covered as with a canopy of gorgeous tapestry, enriched with festoons of the most graceful foliage, flung in wild and irregular profusion over every portion of its



SPHENOPTERIS ARTEMISIEFOLIA.

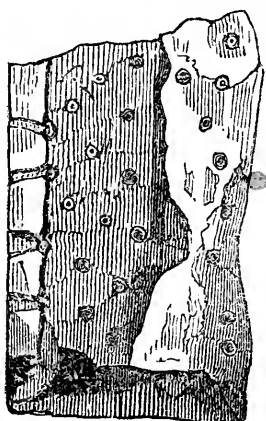


CALAMITES DUBIUS.

surface. The effect is heightened by the contrast of the coal-black colour of these vegetables with the light ground work of the rock to which they are attached. The spectator feels himself transported, as if by enchantment, into the forests of another world; he beholds trees of forms and characters now unknown upon the surface of the earth, presented to the senses almost in the beauty and vigour of their primeval life; their scaly stems and bending branches, with their delicate apparatus of foliage, are all spread forth before him, little impaired by the lapse of countless ages, and bearing faithful records of extinct systems of vegetation, which began and terminated in times of which these relics are the infallible historians." Ferns are, by far, the most abundant

of the vegetable forms found in the Coal-measures. About one hundred and thirty species have already been obtained from the coal, although the whole of the existing species indigenous to Europe amount only to about fifty in number. Our engraving on the previous page represents the *Sphenopteris Artemisiaefolia*, which is one of the most elegant in form.

There are other plants, of an extraordinary aspect, found in great quantities in the Coal-measures, and which botanists and geologists are alike puzzled to give the right place to. These comprise the *Calamites*, so called from the reed-like jointings of the stem; the *Stigmaria*, deriving their name from the stigmata or punctures that are found in its surface; and the *Sigillaria*, which have obtained their appellation from the graven appearance of the stalk. Look at the engraving of the *Calamites Dubius*, (p. 185), and we need not wonder at the difficulty experienced in determining to what tribe such a strange-looking thing belongs. The interior of the *Calamites* was originally hollow, but has been filled up with the petrifying matter into which the whole has been converted. Some suppose these plants to be allied to the horse-tails, but it seems almost a libel on the graceful forms of the latter, to put forth such an assertion. Others believe these to constitute a race of plants now altogether extinct. The *Stigmaria*, of which we present as a representative the *Stigmaria Ficoides*,



STIGMARIA FICOIDES,

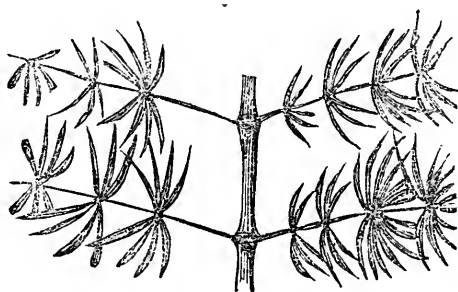


SIGILLARIA LEVIGATA.

is the most common of all plants in the coal formation. Such parts as that here shown, were supposed to be mere portions of the extremity of the arms of a huge dome-shaped body, which divided into twelve limbs, each extending horizontally from the edge of the dome. For a long time this vegetable wonder baffled all conjectures as to its particular relationship with other plants, but at last it was discovered to be the root of the plant next mentioned—the *Sigillaria*—of which we likewise present a fine specimen above.

A large portion of the trees of the era belonged to this tribe, which grew to the height of seventy feet, with regular cylindrical stems, and without branches. The ornamental-looking studs show the places where the leaves were inserted. To the colliers of Newcastle and other places, these fossil stems are but too familiar, under the name of coal-pipes, for they are a continual source of accidents. In mining they are often left in a vertical position in the masses of coal that extend over head, and as they are very heavy, have no branches to support them, are broader at the base than above, and are merely supported by the cohesion of a thin layer of coal, which has replaced the bark, and is connected with the surrounding mass of coal—no sooner does this coating give way, than the column drops out of its bed, sometimes obliquely, sometimes perpendicularly, and kills or injures the workmen below.

There is one plant also very common in the Coal measures, which, were it only for its gracefulness, must be mentioned—the



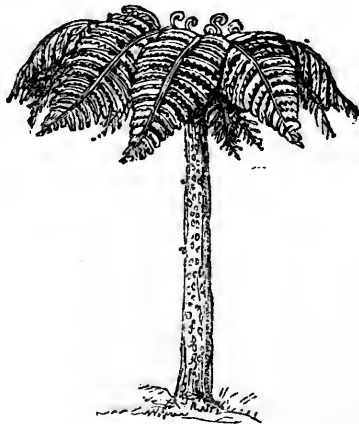
ASTEROPHYLLITES FOLIOSA.

It was probably allied to the Sigillaria. It is found in the Newcastle Coal measures. We need only to add to the foregoing enumeration, the pines, which seem to be allied to the Araucarias, that have of late been so much spoken of in the gardening world, as among the most magnificent of existing coniferæ. As an interesting evidence of the resources of science, we may mention how the discovery was made of the nature of these trees. A gigantic tree trunk was found at Newcastle; there were no flowers or leaves: how were botanists to determine what tree it was? Some ingenious naturalists soon answered this query. They cut off very thin cross slices of the stem, polished them to the highest possible degree, and then submitted the slices to the microscope, when, lo! there were at once visible the peculiar "reticulations" which distinguish the cone-bearing trees, and the particular tree was soon decided to be an Araucaria.

No Grasses, Herbs, Shrubs, &c., in the Coal Measures.—In reviewing these names, we perceive there are no grasses, no herbs, no shrubs—although all these now abound wherever vegetation flourishes. How is this? Are we to assume that they were all absent from the Flora of a time that was infinitely more rife than our own with the influences that develop vegetable life? The Coal measures, as we have seen, afford about eight hundred species; but our present vegetation contains at least eighty thousand! Do these numbers correctly illustrate the comparative meagreness of the one period, and the wealth of the other, as regards variety of life? The answer has been given by one of our most distinguished botanists, Dr. Lindley, who tried the following experiment:—He threw one hundred and seventy-seven plants into a vessel of fresh water. Among them were species that belong to the same great natural orders as those of the Coal measures, and others belonging to those orders most commonly diffused over the earth at the present day. His object was to learn whether the last would perish sooner than the first, and so afford an explanation of their absence from the Coal strata. In two years, one hundred and twenty-one species had disappeared, and of the fifty-six that remained, the most perfect specimens were those of coniferous plants, palms, club-mosses, and ferns with their organs of fructification destroyed—in short, the very same generic kinds of plants that have been so long preserved in the Coal measures; and with regard to the ferns, in precisely the same state of partial and peculiar injury.

Had England, &c., at the time a Tropical Climate?—The tropical character of much of this vegetation is a startling phenomenon. Was there a tropical climate in England when the plants flourished that now form its coal beds? Was there a tropical climate in Newfoundland, which is now still colder than England? or in Melville Island, whose naked lypoborean plains make one shiver only to think of? All these places have their coal beds, and in all these must have once grown a rich and stately vegetation. In Melville Island, the difficulty is enhanced by the geographical peculiarities of the sun's influence. For ninety-four days this luminary is never above the horizon, and for yet another hundred and four days he never sets. Puzzled by these difficulties,

some have even asked the question—"Has the earth changed the position of its axis?" to which, we think, an answer may be given very decidedly in the negative. Dr. Lindley's explanation is, that we are probably deceived in the apparent analogy that exists between plants now living, and that grow only in tropical countries, and the plants of the Coal measures, and that the latter were not therefore, after all, tropical; and where an analogy does exist, he shows that plants, belonging generally to a tropical clime, may yet have members of the family capable of enduring our severest winters. And he gives various instances in point. But all this while, it seems to be forgotten that the ground temperature *must* have been very high all over the world, if the theory already developed, with regard to the earth's gradually cooling down from a state of intense heat, be true. And if such a ground temperature existed, of course there must have been a climate in some respects analogous to the hotter ones of our own era—probably, indeed, much more fervid than any we now have experience of. The extreme abundance, and gigantic size of the coal-flora, have been also attributed to the existence in the air of an extraordinary quantity of carbonic acid—the gas from which is derived the carbonaceous substance of all plants. M. Adolphe Brongniart, the author of this speculation, points, in corroboration of its truth, to the fact, that there is hardly a trace of the existence of any land animals at the time this magnificent vegetation was in existence—the very excess of carbonic acid that nourished the one poisoning the air for the latter. It is by no means clear, or even probable, that the proportions of the atmospheric elements are always the same. Now if the whole of the coal beds in Great Britain alone were again to be reconverted into carbonic acid, the effect would be to increase the proportion of the former to the latter from a thousandth part, as at present, to the eight hundred and fiftieth part. We may add, in conclusion, that the most eminent botanists, from Jussieu downward, have generally considered the coal plants to indicate the existence of a warm climate in their locality at the time they were growing. To sum up, therefore: The high ground-temperature, and the excessive quantity of carbonic acid in the atmosphere, with, possibly, some minor, but still important differences in the capacity of the latter, then and now, for the transmission of light and heat, seem therefore to furnish the true explanation of our finding such plants as tree-ferns in the coal of England, of Melville Island, and of Baffin's Bay—plants that now exists only in the very deepest recesses of the primeval forests of the torrid zone, breathing a damp and unchanging atmosphere, and living alone—true vegetable hermits, without even a neighbour or a parasite to wile away the sultry hours. We must give our readers the pleasure of looking upon one of these extremely picturesque and oriental looking plants in a better state than any fossil will admit. The following engraving represents a



LIVING TREE-FERN.

AMBITION'S MOUNT.

AN ALLEGORY.

IN that season of the year, when the serenity of the sky, the various fruits which cover the ground, the discoloured foliage of the trees, and all the sweet, but fading graces of inspiring autumn open the mind to benevolence, and dispose it for contemplation, I was wandering in a beautiful and romantic country, till curiosity began to give way to weariness; and I sat down on the fragment of a rock overgrown with moss, where the rustling of the falling leaves, the dashing of waters, and the hum of the distant city, soothed my mind into the most perfect tranquillity, and sleep stole insensibly upon me.

I immediately found myself in a vast extended plain, in the middle of which arose a mountain higher than I had before any conception of. It was covered with a multitude of people, chiefly youth: many of whom pressed forward with the liveliest expression of ardour in their countenance, though the way was, in many places, steep and difficult. I observed, that those who had just begun to climb the hill, thought themselves not far from the top. But, as they proceeded, new hills were continually rising to their view; and the summit of the highest they could before discern, seemed but the foot of another, till the mountain at length appeared to lose itself in the clouds. As I was gazing with astonishment, my good Genius suddenly appeared.

"The mountain before thee," said he, "is the 'Mount of Knowledge.' On the top is the Temple of Truth, whose head is above the clouds, and a veil of pure light covers her face. Observe the progress of her votaries; be silent and attentive."

I saw that the only regular approach to the mountain was by a gate called the Gate of Languages. It was kept by a woman of a thoughtful and pensive appearance, whose lips were continually moving, as though she repeated something to herself. Her name was MEMORY. On entering this first enclosure, I was stunned with a confused murmur of jarring voices and dissonant sounds, which increased upon me to such a degree that I was utterly confounded, and could compare the noise to nothing but the confusion of tongues at Babel.

The road was also rough and stony, and rendered more difficult by heaps of rubbish continually tumbled down from the higher parts of the mountain, and broken ruins of ancient buildings, which the travellers were obliged to climb over at every step; inso-much that many, disgusted with so rough a beginning, turned back, and attempted the ascent no more; while others, having conquered this difficulty, had no spirits to go further; and, sitting down, harangued the multitude below with the greatest mark of importance and self-complacency.

About half way up the hill, I observed on each side the path a thick forest, covered with continual fogs, and cut out into labyrinths, across alleys, and serpentine walks entangled with thorns and briars. This was called the Wood of Error; and I heard the voices of many, who were tossed up and down in it, calling to one another, and endeavouring in vain to extricate themselves.

In the pleasantest part of the mountain were placed the bowers of the MUSES, whose office it was to cheer the spirits of the travellers, and encourage their fainting steps with songs from their divine harps. Not far from hence were the fields of FICTION, filled with a variety of wild flowers, springing up in the greatest luxuriance, of richer scents and brighter colours than I had observed in any other clime. And near them was my favourite, but dark walk of ALLEGORY, so artificially shaded, that *the light at noonday was never stronger than that of a bright moonshine*. This gave it a pleasing romantic air for those who delighted in contemplation. The paths and alleys were perplexed with intricate windings, and were all terminated with the statue of a *Grace*, a *Virtue*, or a *Muse*.

After I had observed these things, I turned my eye towards the multitudes who were climbing the steep ascent, and observed amongst them a youth of a lively look, a piercing eye, and something fiery and irregular in all his motions. His name was GENIUS. He darted like an eagle up the mountain, and left his companions gazing after him with envy and admiration; but his progress was unequal, and interrupted by a thousand caprices. When Pleasure warbled in the valley, he mingled in her train. When Pride beckoned towards the precipice, he ven-

tured to the tottering edge. He delighted in devious and untried paths, and made so many excursions from the road, that his feebler companions often outstripped him. I observed that the Muses beheld him with partiality; but TRUTH often frowned, and turned aside her face. While Genius was thus wasting his strength in eccentric flights, I saw a person of a very different appearance, named APPLICATION. He crept along with a slow and unremitting pace, his eyes fixed on the top of the mountain, patiently removing every stone that obstructed his way, till he saw most of those below him who had at first derided his slow and toilsome progress. Indeed, there were few who ascended the hill with equal and uninterrupted steadiness; for, besides the difficulties of the way, they were continually solicited to turn aside by a numerous crowd of appetites, passions, and pleasures, whose importunity, when they had once complied with, they became less and less able to resist; and though they often returned to the path, the asperities of the road were more severely felt, the hill appearing more steep and rugged. The fruits, which were wholesome and refreshing, seemed harsh and ill-tasted—their sight grew dim, and their feet tripped at every little obstruction.

I saw, with some surprise, that the Muses, whose business was to cheer and encourage those who were toiling up the ascent, would often sing in the bowers of Pleasure, and accompany those who were enticed away at the call of the Passions. They accompanied them, however, but a little way, and always forsook them when they lost sight of the hill. The tyrants then doubled their chains upon the unhappy captives, and led them away, without resistance, to the cells of ignorance, or to mansions of misery. Among the innumerable seducers who were endeavouring to draw away the votaries of Truth from the paths of science, there was one, so little formidable in her appearance, and so gentle and languid in her attempts, that I should scarcely have taken notice of her but for the number she had imperceptibly loaded with her chains.

INDOLENCE (for so she was called), far from proceeding to open hostilities, did not attempt to turn their feet out of the path, but contented herself with retarding

their progress; and the purpose she could not force them to abandon, she persuaded them to delay. Her touch had a power like that of a torpedo, which withered the strength of those who came within its influence. Her unhappy captives still turned their faces towards the temple, and always hoped to arrive there; but the ground seemed to slide from beneath their feet, and they found themselves at the bottom before they had suspected they had changed their place. The placid serenity which at first appeared in their countenance, changed by degrees into a melancholy languor, which was tinged with deeper and deeper gloom, as they glided down the stream of insignificance—a dark and sluggish water, which is fanned by no breeze, and enlivened by no murmur, till it falls into a dead sea, where startled passengers are awakened by the shock, and the next moment buried in the gulf of oblivion.

Of all the unhappy deserters from the path of science, none seemed less able to return than the followers of Indolence. The captives of Appetite and Fashion could often seize the moment, when their tyrants were languid or asleep, to escape from their enchantment; but the dominion of Indolence was unremitting, and her victims seldom resisted till resistance was in vain.

After contemplating these things, I turned my eye towards the top of the mountain, where the air was always pure and exhilarating, the path shaded with laurels and other evergreens, and the effulgence which beamed from the face of the goddess seemed to shed a glory round her votaries. "Happy," said I, "are they who are permitted to ascend the mountain!" But while I was pronouncing this acclamation with uncommon ardour, I saw standing beside me a form of diviner features, and a more benign radiance. "Happier," said she, "are those whom Virtue conducts to the mansion of Content!" "What!" said I, "does Virtue, then, reside in the vale?" "I am found," said she, "in the vale, and I illuminate the mountain; I cheer the cottager at his toil, and inspire the sage at his meditation. I mingle in the crowd of cities, and bless the hermit in his cell. I have a temple in every heart that owns my influence; and to him that wishes for me I am already present. Science may raise you

to eminence, but I alone can guide you to felicity!"

While the goddess was thus speaking, I stretched out my arms toward her with a vehemence that broke my slumbers. The chill dews were falling around me, and the shades of evening stretched over the landscape. I hastened homeward, and resigned the night to silence and meditation.

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

THE CLERGYMAN.

So you propose to enter into holy orders. Have you duly considered the nature of the duties you are to enter upon? for this is essential in the very outset. It is unfortunately the case, that the Church is looked upon by some merely as a means for their advancement; forgetful of the obligations and responsibilities that belong to it. This, of course, is not your case. The labourer, indeed, in whatever field, is worthy of his hire; for, as St. Paul says, "Do ye not know that they who minister about holy things, live of the things of the temple? and they which wait at the altar are partakers with the altar? Even so hath the Lord ordained that they which preach the gospel should live of the gospel." Yet the principal point is the spiritual fitness for the duties of the calling—this is, indeed, screened from human eyes. The Searcher of Hearts alone knows those that are His. Men can only deal with outward forms, and the Church of England has determined what these shall be for those that enter her bosom as ministers.

"A religious establishment is no part of Christianity, it is only the means of inculcating it."* "Now it must be remembered that Christianity is an historical religion, founded on facts which are related to have passed, upon discourses which were holden, and letters which were written, in a remote age, and distant country of the world, as well as under a state of life and manners, and during the prevalence of opinions, customs, and institutions very unlike any which are found amongst mankind at present. Moreover, this religion, having

been first published in the country of Judea, and being built upon the more ancient religion of the Jews, is necessarily, and intimately connected with the sacred writings, with the history and politics of that singular people; to which it must be added, that the records of both revelations are preserved in languages which have long ceased to be spoken in any part of the world. Books which come down to us from times so remote, and under causes of unavoidable obscurity, cannot, it is evident, be understood without study and preparation. The languages must be learned. The various writings which these volumes contain must be carefully compared with one another, and with themselves." It is essential, therefore, that those wishing to enter the profession should qualify themselves accordingly. For this purpose, a knowledge of the Greek and Latin languages is necessary. The Old Testament in the Septuagint version has an authority second only to the Hebrew; which, also, may not only be learnt with advantage, but which is now required by some diocesans. The Latin versions or translations from the Hebrew text, are some of them of very ancient date, and highly esteemed. But the New Testament—that in which life and immortality are brought to light—is altogether written in Greek; and it must be remembered, that in this revelation the language was appropriated to far higher and more spiritual notions than were then generally received. Eternity, as understood in the Gospel, was not even comprehended in the pagan world. Under such circumstances, the precise import of the applications of terms to new ideas, is a subject requiring such a deep acquaintance with a language, so as, if possible, to arrive at the true meaning intended; and this, in itself, involves a very serious amount of difficulty, which the scholar alone can fully appreciate. It must, therefore, be evident that a knowledge of the Greek language is of the highest importance, and you should endeavour as much as possible to qualify yourself in it.

As regards a place of education—that is, with reference to a public or private school. This, of course, must be left to the choice of the parents. A public school, (in which term I include what are called grammar-schools,) has, however, this advantage—that

* Paley.

there are exhibitions attached to most of them, which, where the means are inadequate, may be obtained by industry and perseverance, and thus give an opportunity of admission to the universities.

The two universities of Oxford and Cambridge were, for a very long time, the only places where degrees could be conferred—a primary and necessary step for entrance into the Church. Lately, the university of Durham has been established, to supply the wants of the north. There are also two colleges in Wales for the use of that country. The bishops are generally strict in requiring the preparation of a university education, rightly considering it to be the best foundation. And so it is, unquestionably, if, with the discipline duly enforced, the studies of the place are strictly attended to. (The examples to the contrary cannot be set to the charge of the system.) The time required for this ordeal is rather more than three years. The students that go up to either of these universities are comprised in three classes: 1st. Gentlemen, or Fellow-Commoners; the expenses of these are more than for the others, as they are charged double by the college for tuition, commons, &c.: the 2nd, Commoners or Pensioners. This is by far the most numerous class, and the necessary expenses may with prudence be kept within very moderate bounds: 3rd, Servitor Sizar. These are generally students of limited means, and have usually their commons free, and besides receive various emoluments.

The Scholars are, for the most part, elected by direct examination at different periods subsequent to the commencement of their residence at the university, from the most promising and distinguished of the students. They enjoy various advantages, such as having their commons paid for, their chambers rent free, and various weekly or other allowances.

The Fellows are elected from the scholars, after having taken their degrees, and they form the governing body. From these are elected all the officers who regulate the affairs, not only of their several colleges, but of the university. Of course, these honours are not gained without a severe examination, as the mere fact of being a Fellow of a college is looked upon as a high distinction.

Besides those who go through the

regular course, there is a class called *Ten-year-men*, at Cambridge, who are allowed to take the degree of Bachelor of Divinity without having been B. A. or M. A., by the ninth statute of Queen Elizabeth, which permits persons who are admitted at any college when twenty-four years of age and upwards, to take the degree of Bachelor of Divinity after their names have remained on the boards ten years or more. After the first eight years, they must reside in the university the greater part of three several terms, and perform the exercises which are required by the statutes.

The actual cost of a university education for the second, or most numerous class above enumerated, which includes a residence of from twenty-five to thirty weeks in the year, need not exceed £60 per annum. The amount often spent is quite another thing; and to repay the debts thus foolishly incurred, frequently renders the condition of many men for years after, one of severe struggle and hardship.

To enter any college, a previous examination is necessary. The routine of education in the universities varies; but the classics, for the most part, form the groundwork. Even at Cambridge, where mathematics gain the honours, the classics are required for those distinctions which lead to substantial emoluments. A more varied plan has of late been introduced, and students are now obliged to attend at least one class of natural science. Voluntary examinations in theology have also been established, which those who intend to take holy orders must attend. These, however, take place after the student shall have taken the B.A. degree. The subjects are generally the Greek Testament, some of the ancient Greek and Roman Fathers, Ecclesiastical History, the Articles of Religion, and the Liturgy. On leaving the university, and obtaining a curacy, as a title to orders it is usual to read with some experienced divine, who may prepare the intended candidate for the examination which he must undergo before the Bishop of the diocese.* The first ordination confers the order of deacon, and after the curate shall have satisfactorily performed his duties for one year or more, the

* The usual age for admission into holy orders is between twenty-four and thirty.

office of priest confirms the candidate in the full extent of holy orders.

Besides those admitted into the Church after obtaining their university degrees, there are a class called "Literati," upon whom the bishops sometimes confer ordination without this usual preliminary preparation. From these, certificates are required from two or more clergymen, as to their character, and conduct, and fitness, and then they are allowed to undergo the examination. Having passed this, they are admitted into orders as the others.

I have thus endeavoured to point out the usual mode of proceeding for those who wish to become pastors of the church of England; but it must be evident to you, that the external forms which are required, however essential, are, indeed, but a small part of the qualification. The Christian virtues are not those which dazzle the world—these are, meekness, gentleness, charity, long-suffering; and he that would guide others in the paths of religion, must himself bend in all humility to the teaching of the Holy Spirit.

The church of England, as to its temporalities, is divided into dioceses. These dioceses are subdivided into archdeaconries, and these again into deaneries; which last comprehend, in general, a union of several parishes, and of these there are between 10,000 and 11,000 in England and Wales.

The Curate is the lowest rank in the Church. While a deacon, it is his business to assist the priest in Divine service, to preach, to baptize, and also to take a part in the ministration of the Holy Communion. After a continuance in this office for a year, at least, he may be admitted into the order of priesthood, when the sphere of his ministration is enlarged.

The Rector or Vicar is a beneficed clergyman, who, having served as a curate, gains a living either by gift or by right, as many are often family property. The rector enjoys the large and small tithes; the vicar only the small tithes; the large tithes in this case being generally in the hands of some other, either clerical or lay, proprietor.

The Dean is usually a beneficed clergyman, exercising a superintendence over the clergy in his deanery. These are called Rural Deans. Besides these, there are Deans in Peculiar, generally having only a superintendence over some special place;

as for instance, the Dean of Westminster or St. Paul's, the Dean of Christ Church, Oxford, &c.

The Archdeacon is also usually a beneficed clergyman in his archdeaconry; but he must have been full six years in priest's orders. He holds, generally, an annual visitation in his district. It is his special business to see that the churches are kept in repair, and that everything is done according to the Canons of the Church.

The Bishop must be at least thirty years old; he has spiritual authority and jurisdiction over his diocese, and he generally holds triennial visitations. His functions are confirmation, ordination, consecration of churches erected for the performance of Christian worship, and of ground set apart for religious purposes, institution or collation to sacred benefices in his diocese, and superintendence of the conduct of the clergy under him. The bishop is nominally elected by the chapter belonging to the cathedral, but in reality by the Crown, through the prime minister. He is a peer of the parliament.

The Archbishop. There are but two in England, those of Canterbury and York, the former being the chief. They have dioceses over which they exercise control; they also confirm the elections and consecrations of all bishops in their provinces. In a dispute between a bishop and his clergy an appeal lies to the archbishop of the province. The Archbishop of Canterbury claims the right of placing the crown on the head of the king at his coronation; and the Archbishop of York claims to perform the same office for the queen consort, and he is her perpetual chaplain. The Archbishop of Canterbury has also the privilege of conferring degrees.*

Such is an outline of the offices of the Church. These gradations of rank, although perhaps not in exact concordance with the state of the primitive church, have yet been

* *Lambeth Degrees.*—The right of conferring these degrees is a relic of the power anciently exercised in this country by the legate of the Pope, and is by statute transferred to the Archbishop of Canterbury. It received a legal sanction on the determination, about the year 1720, of the case of the warden of Manchester College. Degrees of this kind are very convenient for clergymen, as they are a qualification for a plurality of livings; but, as they imply nothing more than favour, convey little or no honour.

considered necessary, and by long prescription have acquired strength and permanence; and besides, they correspond in a certain degree to the different classes in society. But whatever the influence of station may be among the higher orders of the hierarchy, the parochial clergy are the main prop of the Church; as a body, they have always been exemplary, and undoubtedly exercise the principal power over the people, and this must necessarily follow from their position. Every spire or steeple that the eye rests on in a journey, points to a building where the offices of religion are performed; and however remote the spot, there, at all events, will be found one individual, whose superior education and manners, it may be presumed, spreads a beneficial influence over the inhabitants of the surrounding district.

The clerical life is one of great responsibility, not only in a spiritual point of view, but as a moral example. The clergyman ought to be known to all his parishioners; he is generally the medium through which the charity of the rich flows to the poor. By knowing their habits and character he is the better capable of a just and equal distribution; but he requires tact and skill to adapt himself to the comprehension of those among whom his ministration has fallen; and this is an essential part of the education of the curate on his entrance into his duties. It is his part not merely to go through the offices of the Church, but to order his conversation so that in his daily visits he may make himself subservient to the capacity of his hearers. Many who fall short in this particular, shine in the pulpit, and their efficiency is in consequence much impaired; and all their efforts may then fail in gaining that ascendancy which is essential to influence the lower orders to continue in the paths of their duty. The clerical life, therefore, is a point to be aimed at, and which, from inaptitude, may, in some, require much difficulty in attainment.

As to the occupations of the clergy, these must be regulated by circumstances; but a country life, which is the lot of the great body who enter the Church, gives scope for the study of many branches of science, which may elevate the mind to a higher conception of the works of the Deity. Botany, geology, astronomy, may all be made subservient to

the great ends of religion. A rose, a rock, or a star, are not merely matters of observation or wonder, but their study and contemplation ought to lead to mental elevation, and also spiritual development.

But, above all, the young clergyman should study the Bible. It may seem strange that such an observation should be hazarded; yet so it is, that often whilst accomplishments are sought to give increased effect to the performance of Church duties, the Book of Life is only known so far as a constant reference to those offices gives a superficial acquaintance.

Nor should those works be neglected which can add to a knowledge of the subject, or give greater powers of expression. St. Paul was learned in the works of the heathen: to this is owing that power of language which went at once to the hearts of his hearers. But besides this, there is a body of divinity belonging peculiarly to the Church of England, and which it may well be proud of. Nor are the works comprised in this category merely of advantage for their great knowledge and research, but also for their style; and secular writers have not disdained to go to this source, to form themselves upon such a groundwork of purity of language, and loftiness, elegance, and strength of diction as is contained in the writings of those who may truly be called, "The fathers of the English protestant church."

"And here I will venture so far upon my age and experience, as to insist strongly upon the advantages arising from a more methodical and undivided study of our older divines by the young clergyman. The benefit is two-fold. His mind will be enlarged and elevated, and his style strengthened and refined. No one who has not carefully and reverentially perused the palmary works of the English clergy of the seventeenth century, can adequately conceive the fulness, the depth, and the splendour with which the faith and the practice of a Christian have respectively been taught and confirmed by the members of the church of England. Indeed, with a few obvious exceptions, the great divines are the great geniuses of our literature. He who knows not the calm majesty of Hooker, the passionate subtlety of Donne, the boundless eloquence of Taylor, or the fervent reasonings of Barrow, is a stranger

to some of the highest achievements of the human intellect. But these names are not all. There is a multitude of writers of the same age, inferior in power, perhaps, but equal in usefulness to those already mentioned. Among these I would especially record my veneration for Andrewes; Hall, in parts. Saunderson and Hammonnd, as sermon-writers. Louth, Tillotson, and Smallridge, belong to a later period; but Bull and Waterland, the two classic divines on the subject of the Holy Trinity, are of every age, and have been received as authoritative in every part of Christendom. Some, at least, of these great lights of the Church ought to be found in the library of every clergyman. The study of them will, in a surprising degree and manner, fill, fertilize, and invigorate the intellect. It will prevent the sameness and shallowness of style and manner which too frequently characterise the sermons of those who trust solely to the resources of modern reading, and perhaps it will more than any thing else, after God's grace, help to raise the mind and the heart up to that point from which the true spirit and meaning of the Scripture can be most fully apprehended."

In addition to this body of divinity it may not be amiss for a clergyman to study controversial works. It is right that a teacher should be able to defend the doctrine he teaches. The objections that have been, and will be again urged against Christianity, or even religion, require to be answered, and these should be familiar to you; for in mixing with the world, questions of controversy will sometimes arise, and a clergyman, if unable even to cope with a skilful antagonist in argument, may at all events be able to show his perfect acquaintance with the points which he is called upon to discuss.

I have now briefly pointed out what has occurred to me as being some of the leading points in your clerical career. Hereafter your own experience will be your best guide; but while thus preparing yourself for your future position in your profession, do not forget those matters which concern your inmost self. Religion should be personal: it should spring from the heart, not the head, for you never can be an example to others if the spiritual mirror does not reflect you as an example to yourself.

FAMILIAR CONVERSATIONS ON INTERESTING SUBJECTS.

"MOTHER, what causes an eclipse of the moon?"

"It is caused by the moon passing through the earth's shadow."

"Then it can only take place when it is in opposition to the sun, that is, when it is full moon."

"That is all."

"But how is it, then, mother, we don't have an eclipse every time the moon is full?"

"Because the orbit of the moon does not exactly coincide with the earth's orbit; therefore, the moon generally passes above or below the earth's shadow."

"When can it be eclipsed then, mother?"

"Only when the full moon happens in or near one of the nodes, which never happens more than twice a year."

"What do you mean by node, mother?"

"That point where their orbits intersect each other."

"What is the reason that an eclipse of the moon lasts so long, mother?"

"Because the earth's shadow is much wider than the moon's diameter. It is by knowing the exact distance between the earth and moon, and the width of the earth's shadow at that distance, that astronomers are enabled to tell many years before when an eclipse will take place."

"How are eclipses of the sun caused, mother?"

"By the moon passing between the earth and sun, which deprives us of the sun's light. This, of course, can only occur at the time of the new moon."

"But we do not have an eclipse of the sun every new moon."

"No; for the same reason that we do not have an eclipse of the moon every time it is full. Five is the greatest number we can have in one year."

"But, mother, an eclipse of the sun is only visible at particular places at one time; what is the cause of that?"

"The moon, you know, is much smaller than either the sun or the earth, and of course its shadow can only cover a small portion of the earth, never more than 200 miles in diameter. Thus, you see, an eclipse of the sun cannot be visible to but few of

the inhabitants of the earth at the same time."

"And I suppose, mother, if the moon is inhabited, when we have an eclipse of the sun, they have an eclipse of the earth?"

"Yes; but only of a very small portion."

"Is the whole of the sun ever eclipsed, mother?"

"It is sometimes, but cannot last more than three or four minutes."

"And is it perfectly dark then, mother?"

"Just as dark as midnight."

"Oh, how gloomy it must appear!"

"Yes, gloomy enough, I should suppose, Clara. It is said of one that took place in Portugal, above a hundred and fifty years ago, that the darkness was greater than that of night; the largest stars made their appearance, and the birds were so terrified that they fell to the ground."

"Has there been none since that, mother?"

"Yes; there was one in New England, on the 16th of June, 1806. It was a beautiful clear day, and many stars were visible; the beasts appeared much agitated, and the chickens went to roost, as if it were night."

"Was not Columbus much benefited one time, mother, through an eclipse?"

"Yes; eclipses have ever been regarded with terror, by the ignorant and unlearned of all ages; and numerous ridiculous stories have been invented, by superstition, to account for these wonderful phenomena. Many of the heathens suppose, that in an eclipse of the sun a great serpent is devouring it. The Mexicans used to fast, imagining that the moon was wounded by the sun in a quarrel. Other nations supposed that the sun was angry with them for some cause or other, and thus had turned his face away from them in abhorrence. By fasting, they thought to reinstate themselves in his favour."

"Oh, mother, what absurd ideas! But how was it with Columbus? It is so long since I read it, that I have forgotten the particulars."

"He was at one time driven to great distress, in consequence of the natives refusing to supply him with provisions. He had sufficient skill in astronomy to know that there would soon be an eclipse of the moon; so the day before the eclipse was to take place, he assembled all their chief men together, and told them that the Great

Spirit was displeased with them for their conduct towards the Spaniards, and was about to visit them with great vengeance; and as a token thereof, he would cause the moon that very night to withdraw its light, and appear of a bloody hue—a sure sign of Divine wrath."

"Did they believe him, mother?"

"Some did, and some did not; but as soon as the moon began to be darkened, all were alike struck with fear."

"Then I suppose they took him food, did they not, mother?"

"Yes; they hastened to their homes, and loading themselves with provisions, returned instantly to the ship, beseeching Columbus, who was shut up in the cabin, to intercede with the Deity for them, that he would avert the threatened calamity. Columbus told them he would do so, and as soon as the eclipse was about to pass off, he came out and told them, that the Great Spirit had promised to forgive them, and would again restore the moon to its usual brightness."

"I suppose they had no lack of provisions after that?"

"No; and from that time Columbus was regarded with peculiar awe and reverence, as one who not only knew what was passing on earth, but had intimate communion with the Deity."

"Do the eclipses take place at the same time each year, mother?"

"No; every year is different from the preceding; yet after the lapse of nineteen years, they will occur again, on the same month and day, and with little variation. Thus the almanack of the present year will be found correct enough to use for the year 1871."

"Mother, you said a few days ago, that the moon was the cause of the tides, didn't you?"

"Yes."

"Will you explain to me how, mother?"

"That is just what I intended doing this morning. Although the tides are occasioned chiefly by the attraction of the moon, yet they are affected by that of the sun."

"If you had not told me, mother, I should have supposed they were occasioned altogether by the attraction of the sun. But still I cannot see how the moon can attract the waters on the earth when it does not shine on them."

"I don't know exactly what you mean, Clara."

"Why, mother, you know we have high water in the middle of the day sometimes, and sometimes in the morning or afternoon, when the moon is on the other side of the earth. How can it attract them then?"

"All bodies, you know, attract each other. Now as the moon passes around the earth, the waters at any place over which it is passing yield more readily to this influence than the solid parts thereof: consequently the waters will be heaped up under the moon, as it were. Do you understand this?"

"Yes, but then I should think high water would only be at night."

"Stop a moment, and you will see how it is. On the side of the earth opposite to that which is more immediately under the influence of the moon, the waters are less attracted than the solid parts; consequently the earth is drawn away from them, which causes high water there also. Can you understand now how it is?"

"Yes, and I suppose as the waters are raised under the moon and on the opposite side of the earth also, they must flow from the parts between, which causes low water."

"Exactly; and thus you see the attraction of the moon causes high water at two places, and low water at two places on the earth at the same time."

"But, mother, you said that the tides were likewise affected by the sun."

"Yes, at the time of the new and full moon, when the action of both sun and moon are united, and draw in the same straight line, the tides are the highest; and the nearer these luminaries are to the equator, the more this elevation is increased."

"At what time are the tides the lowest, mother?"

"About the first and third quarters of the moon, when the sun and moon act in a contrary direction; for then the sun raises the waters at the place where the moon causes them to be the lowest. These are called neap tides."

"Where are they raised the most, mother: under the sun, or under the moon?"

"Under the moon."

"Then the moon has more power than the sun?"

"Yes, on account of its nearness to the earth. If it had not, we should at these times have no tides at all."

"What! could not the sun raise the waters as well as the moon?"

"If its power was greater, it could; but on account of its great distance, it does not have as much effect on them as the moon has."

"It is not high water at the same hour each day, is it, mother?"

"No, it is fifty minutes later each day. I suppose you can tell me the reason of this."

"Not unless it is the same as that which causes the moon to rise fifty minutes later each day."

"Well, what is that?"

"Because while the earth was making its daily revolution on its axis, the moon was advancing in its orbit, so that more than a complete revolution is necessary to bring the same parts of the earth opposite to the moon."

"You are right, and I am glad to see you remember so well what I have been telling you."

"But, mother, are there not some bodies of water that have no tides?"

"Yes, in small collections of water, such as lakes, for instance, there are no tides, because the moon attracts every part alike, and thus no part can be raised higher than another. It is partly on this account, and partly because the inlets by which they communicate with the ocean are so small, that the Baltic and Mediterranean seas have such small elevations."

"Are the regular tides affected by any other causes, mother?"

"Yes, strong winds greatly affect them. In the gulf of Hamburg the ordinary tide is from six to eight feet, yet when the wind blows violently from the north-west, it has been known to exceed twenty feet. In the bay of Fundy they sometimes rise as high as seventy feet. Continents also stop them in their course, and the resistance offered from the banks of rivers frequently causes them to rise very high and very sudden."

"Who first ascertained that the tides were caused by the moon, mother?"

"Kepler, and it was afterwards reduced to a system by Newton. As I have finished my explanations of the tides, we will stop for to-day."

and with restless serpent-like eyes, which glittered and moved in the firelight like meteors. He was speaking in a soft measured voice.

"Doubtless, my lord king, your judgment is correct, and Prince Egbert is rightful king of the West Saxons, by the laws of lineal descent; but as his claim is defeated, and Beortric has possession of the throne, surely it might be advisable to listen to the requests of the present king, and yield up the pretender, who has now found refuge here."

"I am under no obligations to Beortric, that I should yield to his wishes," said Offa, sternly; "nor do I fear his power, that I should give up Egbert to death, to please this upstart."

"Nay, noble king," said his wily companion, "there is yet another request, which Beortric's ambassadors have to urge to-morrow—the bestowal of the hand of the princess Eadburgha upon him in marriage."

"Ah!" said Offa, starting from his moody attitude, "that is to be considered. It might be well, Oswald, to tie the hands of this Beortric, by giving him my daughter; but Egbert has gained upon me. I cannot well give him up."

"The treaty, which the king of the West Saxons desires to make, is based upon that condition, noble Offa," said Oswald, "and I fear no other than an affirmative reply will gain his good will."

The king turned fiercely on the speaker, and was about to reply, when the opening of the door checked his speech. He turned, with an angry look, on the intruder, a tall, handsome woman, of some twenty-five summers, habited in a rich dress of purple silk, which hung in massive folds round her noble form; but she gave him no time to speak. Advancing at once, she turned a glance of ineffable disdain on Oswald, and kneeling before the king, said:—

"Forgive me, my gracious father, I must speak with you—even to-night."

"It is an ill-chosen time, Eadburgha," he replied; "but rise, and say on."

"First dismiss the noble Oswald," she said, bitterly. "I shall not need his counsel."

A wave of the monarch's hand was the courtier's dismissal. Pausing, as he reached the door, he glanced back at the princess, with a look of subtle, but deep

hatred, unmarked by her at the time, or she might have trembled at its meaning.

"Now, my daughter, speak," said Offa; "why hast thou thus disturbed my council?"

"Because I have learned the import of thy councillor's advice," she said. "To make me the wife of this hateful usurper, Beortric, and yield the noble Egbert to his power! Oh, shame! shame on the name of 'Offa the Terrible,' if such a deed of treachery be done!"

"What hast thou to do with the policy of my intentions?" said the king, angrily. "It is enough for thee to obey, and do as I devise; go, girl, no more of this."

"Nay," she said, passionately, "thou *must* hear more.—Dishonour thy faith as a king, by refusing Prince Egbert thy protection! Make *me* the tool of thy policy, and such a storm shall break over thee, as thou hast yet never dreamed of!"

"To thy chamber, girl!" said the king, furiously; "how darest thou threaten? Hence! and learn to obey."

"I will not!" she replied, while her face became white with the intensity of her excitement. "I will never obey this mandate. Why, King Offa, hast thou forgotten the spirit of the lioness, Eadburgha? Promise Egbert's liberty, or, by to-morrow, I will be among the dead; and then how will fare the schemes of which thou hast spoken!"

Offa paused as he was about to speak, and gazed for a moment on his daughter's pale and passionate face; then, as if reading a history there, he said, in lower and more subdued tones, "Thou lovest Prince Egbert, Eadburgha?"

"I do, I do!" she exclaimed, "the noble-hearted, royal outcast. Oh! my father, be nobler than ever, and place this wronged king on his throne again!"

"Hush, thou knowest not what to ask," he said. "Thou must not *dare* love this prince. Yet be obedient, Eadburgha. Receive Beortric as thy husband, and for thy sake Egbert shall go free. Here he must not stay, not even in Britain; but I will not restore him to the power of Beortric. Will this content thee?"

His look said, "it *must* content thee." And so the princess felt, and she made no further demur; but humbly saluting her stern parent, left him to the uneasy reflections of his solitude.

The following day witnessed the reception of Beortric's ambassadors by Offa, and the partial acceptance of their king's overtures. The banishment of Egbert from Offa's court, and the hand of Eadburgha were promised; and with this the West Saxon monarch was compelled to rest content. England, at this period, consisted of many states or kingdoms, of which Mercia, the dominion of Offa, was the chief, and constantly increasing state. Wessex was its most powerful rival. The East Saxons were subdued; and East Anglia was claimed by Offa, though his right was still disputed by Ethelbyrht, the king of that country. A constant state of warfare was being carried on, in which might was generally conqueror over right; and of this Offa had shown his adversaries many examples, by a succession of conquests throughout his reign. The marriage of his daughter to Beortric secured the peaceful conduct or assistance of this one of his neighbours. But the desire of conquest was yet unquenched, and peace formed no part of the policy of the Mercian king.

Weeks had passed away, marked by the banishment of Egbert from the Mercian dominions, and the preparations for the departure of Eadburgha to the abode of her future husband. She was to be escorted to her new home by the chief nobles of the court, headed by her brother Eegfrith, then associated with Offa in the royal dignity; and after the bridal, they were to return, leaving the unwilling bride in her strange and hated home.

Doubtless she was thinking over these things, as she sat at eventide by the wooden casement of her chamber, and looked forth on the distant scene. At her feet sat a young fair girl, of great beauty, with large dove-like eyes, now fixed on the face of Eadburgha; this was the princess Risola, Offa's youngest daughter, a mere child of fourteen years. Her sister's hand lay in hers.

"Thou art not happy, Eadburgha," said the child, "yet thy tears never fall, as mine would, if I were going to a strange land. Tell me, why dost thou not weep?"

"I cannot, Risola, I shall never weep again; they take me from all I have loved, even from thee, and my heart is turning to stone. I may grow harsh, cruel, and revengeful, but I shall never weep. Poor

little child, thy tears are enough for both! Listen, Risola. Shouldst thou ever love, and be given to one thou hatest, die; do not live to scorn thyself; die, Risola! it is easy if thou hast the will."

While the princess had been speaking, another and earnest conversation had proceeded between Cwendritha, the queen of Offa, and the crafty Oswald, who towards the close of Eadburgha's impassioned speech had advanced to the sisters, and now startled the elder by the unwelcome tones of his soft voice.

"Noble lady," he said, "why speak of death, when life offers so much worth acceptance—wealth, honour, a crown?"

"Peace!" she interrupted; and bending to Risola, a whispered word dismissed the fair girl to her mother's side; then, raising her lofty form to its full height, she continued—

"Beware, Oswald, thy taunts may be carried too far; and though the princess Eadburgha may be powerless, the queen of Beortric may use her power to thy peril."

"Nay," he said, still more humbly, "I would not dare to use a taunt. I pity too deeply the fate in store for you. It may yet be averted."

"Hence, traitor," she exclaimed. "I know thy wiles too well. If it be sin and shame to wed Beortric, because I love another, how far blacker the crime to buy my freedom from *that* yoke, by even looking on *thee*, save with contempt?"

"Yet this pride may be repented of, scornful Eadburgha," he replied, with a glance of malice; "better wed Oswald, though not a king, than suffer all that Oswald's brain may devise, and his eye see even now before thee."

"Do thy worst, thou evil spirit," she replied: "but hence, out of my sight, and beware—cross not my path too often!"

He left her with a bow and a smile; but she shuddered as she beheld it. To her, it told a tale of future woe—alas! only too fully realised.

* * * * *

Five years had passed away—five years of change, of war, conquest, and outward excitement, and still the dominion of Offa increased, and with it his desire to extend his kingdom. East Anglia still resisted his summons to surrender: its king, Ethel-

bert, a young and noble prince, resolutely retaining his supreme power in that state. But rumour had carried to the prince's ears reports of the wondrous beauty of Offa's youngest child, the fair Risola; and with a degree of chivalric romance uncommon in those days, he resolved to visit the court of Offa, and see this paragon of loveliness. Confiding his intentions to one noble of his court only, they took the opportunity, while abroad on a hunting excursion, to withdraw from the chase, and in the disguise of minstrels entered Offa's territory. It was not difficult to gain access to the palace, in their assumed characters; the skill of Ethelbert rendered him welcome, and ere long he was summoned to the royal presence. There he beheld Risola, and at once bowed to her charms; and ere he left Mercia had contrived to see the princess, confess his passion and his rank, and obtain her consent to become his bride; while Offa, unconscious of the proximity of his foe, allowed the strangers to depart, unmolested and unnoticed.

Ere long, Ethelbert despatched messengers to the Mercian king, announcing his desire to visit Offa's court, for the purpose of obtaining the hand of Risola. This proposal Offa willingly received; and the young prince, with a train of nobles, with much pomp and splendour proceeded into the Mercian territory. Risola received the announcement of her father's wishes with quiet acquiescence, but with a heart beating with hope and joy.

Once more, at the midnight hour, Offa sat in the apartment described at the opening of this tale; once more the lamps shone on his own dark brow and the sinister glances of Oswald; but another was now present, Cwendritha, the queen of Offa, and her deep, half-suppressed voice echoed through the stillness with words of evil omen.

"Thou hast scarce a woman's wit, terrible as thy name is, king Offa," she said; "why should it be needful to give Risola to the Anglian prince? She may be a prize worth gaining to some more powerful and wealthy monarch."

"Thy meaning, Cwendritha? thou hast some hidden meaning. How shall I secure his kingdom and not give him our daughter?"

A glance passed between the queen and Oswald as the king spoke, and it was the latter who replied—"Your enemy is in your power, my lord king; your forces could compel his dominions to subjection; while deprived of their prince, all is easy and plain."

"Aye," said Offa, gloomily, "another prisoner, and another child pleading for his freedom. I would there was another way."

"There is," said Cwendritha, rising and bending to the king's ear: her cheeks were pale and her lips compressed; but from them hissed words which startled even the sternness of Offa,—for the burden thereof was—*death!*

Three days later, Oswald stood in the presence of Eadburgha, Beortric's queen. She had gathered around her every evidence of her state and power, as though to brave the keen and mocking glance of the hated noble, whom she never willingly received. He came now as a messenger from her sister, the fair Risola, the only being for whom the heart of Eadburgha now beat with kindness; and, as she marked the smile on Oswald's thin lips, and the light of his eyes, her haughty head bowed, and her lip trembled with a vague presentiment of ill.

Bowing humbly before her stately presence, the courtier said, speaking slowly and clearly, as though to add to the effect of the words, which he saw fell like poisoned daggers on her heart, "My message from Princess Risola is a sad one, gracious lady. She charges me to tell you that she is in great sorrow, for that the king, your father, has resolved upon the death of the noble Ethelbert, as a traitor against his authority. The second morrow from this seals his doom."

For a moment, the strong heart of the queen yielded, and bowing her face in her hands, her frame shook with powerful emotion. Then turning, she dismissed her attendants, and, for a while, gazed earnestly at the half-smiling, but outwardly sad face before her.

"Oswald," she said, "this is thy work; and two young, noble hearts must be sacrificed to thy hate. Oh! thou worse than fiend! can nothing move thee to have the heart of a man?"

"Yes, noble lady," he said, quietly,

"and Ethelbert may yet live. His fate rests with thee."

"Thou subtle schemer!" she replied passionately. "I know thy meaning; thou wouldst render Eadburgha a disgraced outcast, a very shame to womankind."

"Hush!" he interrupted. "Were Prince Egbert before thee as I am, pleading as I am, a less price than a sister's happiness, perhaps life, would lure thee from Beortric's court to a life of seclusion with him, and the disgrace and the shame find softer names."

"Hence! hence!" she exclaimed, extending her hands to repel him. "Thou wilt drive me mad, and I shall kill thee!"

"I fear thee not, royal Eadburgha," he replied, calmly; "this passion is useless; even now the time flies which bears the doom of Ethelbert on its wings—speak, and he may yet be saved!"

"Never! never!" she almost shrieked. "Away, or I shall murder thee! Oh, Risola! my child, my sister, I will go to thee; I fear I cannot save thee."

But Eadburgha's resolve to go to her sister met with opposition from Beortric, whose objections were fostered by Oswald, during a whole day—a day of maddening agony to his queen. At length, he allowed her to depart to her father's court; but although she hurried her progress by every means in her power, Oswald thwarted every endeavour, and two suns had set ere she reached Tamworth. Then she knew it was too late; the look of triumph on Oswald's features told the tale. Headless of those who hurriedly hastened to receive her, she passed through the great hall, and up the winding staircase, to Risola's own apartment. A group of weeping maidens were gathered by the couch of their fair young mistress, who lay with closed eyes, and cheek of marble hue, speechless and motionless, as though death had already claimed her. Cwendritha stood by the foot of the couch; but between her and her eldest daughter no word of greeting passed. Eadburgha bent over her long-cherished sister, and whispered her name, uttering words of love and pity. Then a slight tremor shook the fair form of the sufferer, the large, soft, sad eyes opened, and the arms twined round the neck of her lost friend.

"Thou knowest all, Eadburgha," she murmured; "they have murdered him!

Oh! my sister, my sister—would I could die too!"

"I know all, Risola; I am here to hear thy last words, and to avenge thee. My stricken dove, thy only rest will be the grave! God grant thou mayst find it soon—a happier doom than mine, who can live but for despair."

Through the long night, the elder sister watched over the struggles of her beloved one's breaking heart. She wept not, spoke not, save to cheer the dying girl; but when the spirit had departed, she arose, kissed the pale lips of the dead, and raising her right hand to the light of the morning sky, uttered a vow, of which those who saw her lips move, heard no word, nor guessed its fearful import.

* * * * *

Years passed away, and the name of Eadburgha became known only as one of hard heart and remorseless nature. Stern, cruel, and ambitious as she was, the subjects of Beortric equally hated and dreaded the sharer of the regal dignity; and the secrets of that hardened heart were alike unpitied and unknown. Oswald, since the death of Risola, had avoided the court of Beortric, feeling, perhaps, how justly he had incurred the hatred of the queen. But as time elapsed, this impression grew weaker, and at length he went as ambassador from Offa to the Saxon king. By Eadburgha he was received with cold and stately dignity, and he felt secure. How little that security was based on reason, the event proved. Eadburgha poisoned the cup which she sent to the author of her life's miseries, but by some chance it reached her husband's hand, and the fatal potion destroyed a wrong victim.

Horror, disgrace, remorse, fell on the unhappy criminal. The nobles, not content with her banishment, decreed that the title of queen should thenceforth be extinct, and the dignity at an end.

Eadburgha fled to France, thence to Italy, tortured by the thousand remembrances of the past, in poverty and misery, wandering from place to place, till, when at last death ended her crimes and sufferings, she rested in the grave of a common beggar, reviled and unforgiven by earthly judges—but surely worthy some pity, for the endurance of storms which wrecked a once noble nature.

THE CHOICE OF A PURSUIT FOR LIFE.

BY A. C. GOWEN, ESQ.

I PROPOSE to offer a few remarks, hastily thrown together, the result of some little observation, upon the importance of a proper selection of a pursuit in life; and also to say something of the manner in which it should be followed, and of the objects which we must keep in view while engaged in it. I said, the result of some little observation, for the profession to which I have the honour to belong has afforded signal and lamentable instances of the folly and misfortunes of those who enter a pursuit for which they are all unprepared by any previous systematic course of education; and without the requisite talents which might enable them to overcome the defects of early education, if, indeed, they possessed taste or genius for the pursuit; which latter qualities I take to be indispensable to success in any profession, business, or occupation.

If a mechanic is desirous of performing some great physical movement, he selects an instrument capable of effecting the desired end. Archimedes might have moved the world, if he could have found a fulcrum for his lever, but surely it must also have been a desideratum, that the lever should have been of sufficient strength, and capable of moving the great orb of the world. Now is it not of essential importance that in looking, to use plain language, for something to do, we should select something which we are *capable of doing*; something for which we possess the physical and intellectual qualifications; something in which, under Providence, the great Disposer of Events, we may engage with some hope of attaining success, at least as far as our imperfect and clouded reason enables us to judge of the future. Of one thing we may be very certain—it takes no prophet to predict that those who rashly engage in any pursuit, without the necessary abilities, are sure to meet with failure and disappointment; and to afford us, if you will allow me to make use of a homely, but instructive illustration, a practical verification of the doctrine intended to be conveyed by the fable of the ox and the frog. The intellectual and

physical powers of men are as various as the pursuits which engage their attention. Certainly, the mental powers present an almost infinite variety, dwindling down by imperceptible shades, from the highest to the lowest degree; presenting in some individuals those sublime powers of mind which have given to the world a Bacon, a Newton, a La Place. In others, the mental powers are so feeble, so contracted, that the munificent charity of the present age, in extending to them its protection, has found a most noble and proper object for its exercise. Between these extremes, how many intermediate degrees! and what, it is important to remark in this connexion, what varieties of talent, of taste, and of genius!

It is no part of my present task to enter into a metaphysical discussion of the reason of these diversities in the powers of the human mind; or to assign a cause for the various talents or tastes of mankind. It is enough for our purpose, that these diversities exist, and exist, I will hazard the assertion, in spite of education, and not through the perversity of the individual, but because education cannot confer intellectual power where it is altogether wanting, or exists only in a very limited degree; nor can it supply taste, genius, or talent for any particular avocation. You cannot cause plants to grow in a barren soil; and no education can supply the absolute want of the reasoning faculties. In speaking of the powers of the mind, it is a fallacy to predicate of education the term supplying—it does not *supply*. It has been well remarked, that it “*educes, leads out, improves, enlivens, increases, and perfects*” the innate powers of the mind; but how can it give the germ, which is the gift of the Creator? Circumstances perform, undoubtedly, an important part in increasing or retarding the development of the rational powers and affections of the mind; and, of course, to a different degree in different individuals, depending for the force and permanency of the impression on a pre-existing state of things, on what I shall call, no matter how incorrectly, if it conveys my idea, the natural powers of the mind; and, undoubtedly, to a certain extent, on impressions previously formed. The same remarks apply to the diversities of taste in different individuals, and to capacity or

genius for particular pursuits. You cannot educate a man to become a poet, a painter, a sculptor, or an orator either; although it has been said that a poet is born, and an orator is educated. Could a Homer, a Virgil, or a Milton, by any process, teach a man to produce those sublime poems which are the wonder of the world? How shall Horace impart the fire of his genius; a Shakspeare, the "thrilling music of his magic verse;" or a Moore, the sweetness of his strains? What Phidias or Praxiteles shall educate any man to that lofty intelligence of the ideal, which has manifested itself in the life-like productions of the great sculptors? Or, who shall teach him to make

"Niobe grieve in stone again?"

What Ctesislaus shall instruct him to chisel in marble that half-living, half-dying expression which has come down to us in the statue of the Dying Gladiator? What Apelles shall bestow upon him the "gift of a painter's eye?" Or who shall teach him to rival the graceful productions of the pencil of Raphael? Or what great Orpheus of the lyre shall educate his ear to the appreciation of divine strains; or put music in his soul?

It was once a favourite, but now an obsolete idea, that everything in the intellectual and moral system was the result of education. Place every human being, if it were possible, in the same situation; give them the same facilities for developing the powers of the mind, and for improving the taste; and how soon would you see some, in this intellectual race, pass the goal with "lightning-like rapidity;" whilst others break up at the start, or lag wearily along the road. Now, I take it, that these diversities exist in all the qualities of the human mind; diversities in the powers of the intellect; diversities of taste, of talent, and of genius, which are not always capable of being controlled or moulded by education.

The same may be said of the physical strength of men, and it affords me an opportunity of illustrating what I mean. He who is born with the sinews of Hercules, may develop to a still greater extent the strength of his muscles, and perform new wonders. So may the Lilliputian—but still you have the difference between the giant and the pigmy. One cannot perform

the task of the other without degradation on one side, or a certainty of failure on the other. You may develop the faculties of both, but how shall you change their relative positions?

"Pigmies are pigmies still,
Though perch'd on Alps."

And yet the world presents to us the singular spectacle of many of these pigmies upon Alpine heights; and of many a noble intellect debased by low and trivial occupations. How many "mute, inglorious Miltons" have passed to the tomb! How many chained and intellectual Samsons have died and left no mark! It would be both instructive and amusing, if we had time, to enter into a speculation of how much the world has lost from the misapplication of talents. Of the injuries which society and individuals have received from incompetent men engaging in improper pursuits, both our reading and our observation enable us to speak positively and feelingly.

Men do not succeed in what they undertake, because they make an injudicious selection of an occupation; or because they have rashly, and without due consideration, engaged in a pursuit, for which a little reflection must have taught them they were physically and intellectually unqualified. Their want of success they impute to improper causes. They blame their friends, lament their fate, and tell you that they have been unlucky. Perhaps this is a fruitful source of many of the crimes and follies of mankind—men do not succeed in their pursuits; their failure often gives them a mortal disgust of the world; and a useless and misspent life often has its cause and origin in the fatal mistake of selecting a pursuit without reference to the possession of those qualities which are essential to success. Let no man estimate lightly the consequences of making a bad selection. It is no easy matter for every man to retrace his steps, or to retrieve the consequences of his errors. The thorns he reaps "are of the tree he planted," but the discovery comes all too late; he is overcome by that sickness of heart and disgust of the world which men are weak enough to succumb to, when their hopes have been disappointed and their ambition blasted; unless, indeed, he possesses that unusual strength of mind which sometimes manifests

itself in misfortune; that divine light of reason, of philosophy and of religion, which burns the more brilliantly as the darkness thickens around him; which alone can illumine his path, while he struggles through the night of misfortune; and which never grows dim, until the full splendour of the morning sun has again burst upon his delighted vision. But let no man flatter himself that this divine light will be vouchsafed to him, or that he possesses sufficient fortitude to bear the misfortunes often incident to an injudicious selection of a pursuit; or, that when he discerns them, he can readily retrace his steps. Like ignorant and careless children, he has wandered into the woods, with the intricacies of which he is all unacquainted; he loses his way, and makes no progress; he finds no land-marks by which to guide his steps; and when the heavens are overcast and night comes on apace, he discerns through the overhanging clouds no star of hope; he yields ingloriously to his fate, and looks upon death as the only refuge from his woes. Should the clouds break away, and the sun come out in his splendour, and the rainbow of hope overspread the whole arch of heaven; should kind friends lead him into another and an easier path, his energies are so worn out, his limbs are so sore and feeble, that he mistrusts the glorious signs of hope, and cannot be incited to renewed exertion.

Can there be any doubt of the bad results of an improper selection of a pursuit; or can there be a doubt that many crimes are directly traceable to this source, and that it is often the cause of a misspent life, and that to it many a premature grave is indebted for its occupant? Did you ever possess a valued friend, endeared to you by many tender recollections; by the memory of many happy college hours spent together; by the memory of many noble qualities of head and heart, for whom, perhaps, you had predicted a brilliant future? And did you ever hear that such an one had been cut off in the morning of life; gone down, it may be, to the grave in sorrow and dishonour? Doubtless, the news was unexpected; you were shocked at its recital, and, perhaps, made some inquiries into the reason. You found that the history of his life was easily told, and one with which you were already familiar; that

his case was but one among a thousand; that he found the details of his occupation uncongenial to his taste, and soon abandoned it for the more alluring pursuit of vice—Vice, that takes possession of every unoccupied and unguarded avenue of the mind, and always exhibits her shameless figure wherever she thinks the unwary will seek a refuge from their troubles in her contaminating embrace! But, had he been engaged in the legitimate pursuit of a well selected occupation, harmonizing with his tastes, in which his labours were given with pleasure, how could he have been attracted by her lascivious glance! or, if she had enticed him for a moment, would not the first polluting kiss have driven him back to gaze again with renewed admiration upon the lovely face of Virtue, firmly resolved never again to withdraw from her approving smiles.

In addition to all this, let every man who has the least desire to discharge his duty, recollect, that by engaging in a pursuit for which he is incompetent, and which can be followed by no useful result, he inflicts a positive and negative injury upon society. He has no right, on the one hand, to make society the victim of his incompetency; nor, on the other, to deprive it of those talents, whatever they may be, which God has given for some useful purpose, and which it should be his business to discover.

It should be our business to take care that incompetent men do not get into office; for, in reality, the mischief which may result from their blunders is incalculable. They are dangerous everywhere and anywhere; in public as well as in private situations. Your own personal observations must furnish you with numerous instances of the unfortunate results of an ill-selected occupation. Such instances are, unfortunately for us, by no means rare. Have we not seen most righteous causes lost to clients, through the manifest incompetency of their counsel? Have we not deeply sympathized with some eloquent and learned advocate, whilst he in vain endeavoured to make some puffed-up specimen of judicial importance, with a "mole-eyed mind" and contracted grasp of intellect, comprehend how some important principle of law has a bearing upon the case under consideration? Alas, for him! he has undertaken a hopeless task; the

learned judge cannot see it, he cannot understand it, though all the time he thinks himself not one whit the less learned, or the less dignified, or the less important.

Did you ever linger around the couch of some dear relative or friend, and watch, with trembling anxiety, the flickering lamp of life? And did it expire because he, in whose hands, under Providence, were the issues of life and death, was a bungler, and did not understand his business? Well, what is your opinion of such men? In what estimation will you hold him, who sacrifices to his ignorant vanity, which will not permit him to understand himself, the property, the health, or the lives of the community? Perhaps he is as much to be pitied as his victims! But what is your opinion of a man who follows a profession for which he knows himself to be unqualified, and who subjects his fellow-men to the often disastrous results of his incompetency? Is he not a robber and a murderer? Not an open, generous robber, who attacks you on the highway and in the light of day; but a thieving knave, who robs you under false pretences! Not a murderer, instigated to the diabolical act by the wild lust of passion, or the desire of revenge; but a skulking assassin, who murders in a way in which it is difficult for the law to take hold of him; for it is no easy matter to prove that the patient was the victim of his malpractice. All such men have mistaken their vocation, and when they have made the discovery, (which, however, they are often the last to make,) they cannot conscientiously, and without incurring the charge of positive crime, continue to subject society to the results of their mistakes.

I have mentioned but a few instances of the direct evils which individuals bring upon themselves and others, by selecting an improper pursuit. I leave it to some more experienced hand to fill up the picture. And, believe me, such a picture is worthy of the labour of a great artist, and would not be without its use in this age of ours—this nineteenth century,—this century of true science and of ignorant charlatanism; of great learning and of impudent pretension.

Let it not be said that men do not succeed in their undertakings, simply because they are not industrious and perse-

vering. As a general proposition it is by no means true. But, even admitting it to be so, it removes no censure from their shoulders, nor does it disprove a single proposition which I have advanced; for is it not notorious that men are seldom industrious enough to overcome the difficulties of a profession or an occupation for which they have no particular liking; and that, frequently, no degree of industry and perseverance can overcome positive distaste for any particular avocation? But men who have made judicious and fortunate selections are generally stimulated to industrious exertion by the very love of their occupations.

The pursuits which engage the attention of mankind are numerous. There is a varied field, from which, undoubtedly, almost every man may select something in which, if industrious and persevering, (and he is very likely to be so who is fortunate in his selection,) he may be tolerably certain of succeeding. And how much better would it be for himself, for his family, for the interests of society, and of the world at large; for the advancement of trade, the increase of commerce, the improvement of agriculture, the progress of the arts, the investigations of science, if every man were engaged in that particular avocation which is congenial to his talents; how might those talents, then, be improved and perfected! how easily could he then swim with the stream, instead of wearing out his mental and physical energies in struggling against the current! If this were done, and a generous encouragement given to every man to follow the bent of his own genius, what a mighty impetus would be given to the arts and sciences! what treasures might be added to the department of the fine arts!

Had such always been the case, as to a certain extent it undoubtedly might have been, should we have been obliged to witness those specimens of corrupt literature, which, to the disgrace of the present age, have been encouraged to appear? The authors of these wretched productions, which make up, in wickedness, in impiety, in infidelity, in atheism, and in ridiculing all that is really good and noble in human nature, and in pandering to the most depraved tastes, whatever they want in eloquence and wit, would have been banished from the dominions of literature, or

rather they never would have found an entrance within her sacred precincts, which they only profane and corrupt. They would have been employed in other occupations, suitable to their capacities; would have done no harm, and, perhaps, have subserved the interests of the community. And, undoubtedly, if every man had been put in his youth to a proper occupation, we may safely affirm, without justly incurring the charge of being visionary or utopian, that the world would, this day, present a very different spectacle. A young man transferred from a proper school, or from the parental roof, when the early lessons and practice of virtue are still fresh in his recollection, to an occupation for which he has taste and capacity, has enough to do in its legitimate pursuit, to keep himself from being "blown about by every wind of doctrine," or captivated by every modern innovation. Bound by the adamant chain of self interest, he is very likely to remain a good citizen; nor is he at all likely to be found among the number of those promising young men, who boast the advantages of a modern education, who do nothing and everything, who talk largely of the rights of man; and are often found making inflammatory addresses to the first mob that is arrayed against the rights of individuals and the laws of their country: who, when the times are quiet, sink to the bottom amidst their native mud; but, when the waters are disturbed, rise to the surface and contaminate the whole stream.

In the legitimate discussion of our subject, the question arises, How is a young man to discover that pursuit, that "something" in which, as Bacon tells us, every man may excel; and how is he to avoid the danger of engaging in which he may discover all too late that his expectations of success have been founded on no rational hope.

It appears to me that young men are in great danger of deceiving themselves, in the estimates which they make of the difficulties incident to the successful prosecution of any profession, business, or occupation; and, in their estimates of their own ability to meet and overcome these difficulties.

In many cases, perhaps, it would approximate more nearly the truth, to say, that they do not make any estimate at all. Most young men, who pass through college,

embrace the learned professions almost as a matter of course. Probably, one motive which induces this large accession to the professional ranks, is a very unworthy one. Professional avocations are looked upon as more respectable, or more aristocratic than the pursuits of trade, agriculture, or the mechanic arts. Shall I pause to stigmatise such motives as these; or, to point out how unworthy they are? But surely men greatly deceive themselves in their estimates of respectability. It is not the pursuit, but the conduct, the abilities, and the success of those engaged in it, which confer respectability. Now there is nothing less respectable than a quack or a pettifogger; and one or the other of these appellations he is very likely to deserve, who only embraces a profession under the mistaken idea that his diploma is a *patent of aristocracy*. Other pursuits are equally respectable; and the humblest is as much so, if the qualifications of him who is engaged in it, are equal to its requirements.

Horace advises a poet to study thoroughly the nature and force of his genius. And it appears to me that every man might profit by the same advice, before he selects an occupation. If he thinks of engaging in the profession either of law or medicine, let him studiously inquire what are those qualities which enabled others to succeed. Does he possess those essential qualifications, or is it at all likely that any degree of industry and perseverance will ever enable him to acquire them? Is there in the profession which he proposes to adopt, any thing uncongenial to his tastes; and if so, is it probable that he will be either industrious or persevering? Has he prejudices which will operate to his disadvantage? Can he easily overcome them or divest himself of them? Has he the patience to go through a long course of study, and to await the often slow returns of professional honours and emoluments; and, as has been well asked by an elegant writer on *Law Studies*, "will his mental and physical energies not give way under the constant excitement and severe labour of a professional life?" Let no man think this latter question an unnecessary one. Many fancy that professional life is their proper sphere, because they possess feeble constitutions. Let not ambition and the possession of the highest qualities of the

human intellect, induce any man to adopt a policy so suicidal. How often have we seen the aspirant to professional honour fall a martyr to his ambition! At what short intervals has the laurels been displaced by the cypress! Let him, then, who thinks of embracing a profession, answer all these questions. If he cannot answer them affirmatively, then let him abandon the idea of engaging in a pursuit which must inevitably bring upon him failure and disappointment. But let him beware of mistaking enthusiasm for talent or genius; let him beware of too much self-confidence on the one hand, and too much timidity on the other. Let him not be deterred from entering, or let him not abandon a profession, because he cannot attain the topmost round of the ladder; for it is impossible that all should do this. The question for him is, can he engage in it without a certainty of failure, and without inflicting injury upon others? If he has the qualifications to maintain a respectable position, and industry and perseverance to overcome its difficulties, then let him engage in it with all the energy of which he is master. Some men possess an almost intuitive consciousness of their ability to attain professional distinction; let not poverty or want of friends, or deficiencies of early education, prevent such an one from obeying the divine voice within. It will enable him to surmount all difficulties, and to triumph over all opposition. Animated by this consciousness of ability to succeed, how many have risen, by dint of their own unwearied exertions, from the very lowest depths of obscurity to the highest eminences of professional distinction! Many of the greatest men have risen from obscurity to honour and fame. And if the biographies of all the great men who have lived and died, were faithfully examined, I doubt not that by far the greater number would be found to have emerged from obscure and humble positions.

(To be continued.)

GEESE.—Expeditions are sometimes sent from Nova Zembla to the island of Kolgujew, to kill and salt geese. A merchant of Archangel has been heard to declare, that 15,000 geese have been thus killed here in two hunts.

THE BIRD TALISMAN.

AN EASTERN TALE.

FOR THE TUTOR'S YOUNGER PUPILS.

(Continued from page 171.)

THE princess was awakened by the sun shining in through a doorway in the wall, and found herself in a very little round chamber, which communicated with the gallery outside by means of the doorway; and on one side, in the stone floor, was an opening communicating with the stairs, and through which she had come up. She was afraid to go out into the gallery, for fear of being seen—for the cadi's wife and the parrot had charged her on no account to run any risk of being seen. The daws were gone in search of food, and the parrot, as soon as she and the princess had breakfasted on some provisions she had brought with her, flew down into the garden, to hear how things were going on. She found the place in a great commotion. The king's officers were in the house, searching for valuables. The cadi produced all his gold, silver, and jewels, and whatever else was of value. His horses were brought from the stables, and all the slaves were mustered in the court, that the officers might choose those that were worth seizing. Having chosen such as they thought worth taking, they were going away, when a slave-girl, who was amongst those that were taken, cried out to the officers—"There is another slave-girl somewhere in the house, who is worth more than all of us put together; but she is the favourite, and they have hid her." The officers asked what her name was. "We call her the parrot girl," said she, "because she always has a nasty old parrot with her: there it is," said she, pointing to the parrot, "and you may be sure the parrot girl is not far off." It was jealousy that made the slave girl so spiteful. The cadi said to the officers, "I have such a slave, but where she is I do not know; my house is open to you, search everywhere." It was true he did not know where she was; all his wife had told him was, that the princess had gone to a safe place, and he did not wish to hear more, that he might be clear of blame. The officers searched everywhere in vain;

at last they said they supposed she had run away, and would probably be caught before long; so taking their spoil with them they departed, leaving the house stripped of all its most valuable furniture, and with only a few old slaves, not worth taking away.

As soon as they were gone, Zuleika ran to her mother, and said, "Oh, mamma! Shereen may come back now!" "No," said her mother, "she is much safer where she is; it will not be safe to bring her back till the enemy's army is gone." Zuleika



was very sorry to hear this, but she begged her mother to let her go and visit the princess at night, to which she at last consented, if there should be no appearance of danger. "Oh!" said Zuleika, "those dear birds will watch, so that we cannot be surprised." She then sent by the parrot a note to the princess, promising to come and see her as soon as it was dark, and to bring some provisions with her.

Nearly all day the princess sat in her little chamber, sometimes talking to the parrot, or working, and sometimes reading a book she had brought with her. At last she perceived a loose stone in the chamber wall, and pushing against it with her hand, it gave way and fell out, leaving a square hole in the wall, through which she could look into the garden of the *cadi's* house. As soon as she found this out she was delighted, and still more when she found that through this hole she could see the window of the room in which she and Zuleika used to sleep. It seemed very long before night came, but at last it grew dark, and the parrot having set the two daws and the great owl to watch on different sides of the ruin, flew to the garden to fetch Zuleika, who was waiting on the terrace with her mother. "I will wait for you here," said her mother; "send the parrot back to me presently, and when it is time for you to

come away, I will send her to call you." Zuleika then went down the ladder, and was soon under the minaret; upon a signal from the parrot the rope-ladder was lowered, and Zuleika climbed up, carrying with her a basket full of all sorts of provisions. The two little girls flew into each other's arms, and after some little time the basket was opened, and they sat down to supper, and an excellent supper they made, for they had neither of them been able to eat any dinner, for thinking of the pleasure of meeting that evening. The parrot flew back to the terrace to the *cadi's* wife, and the princess showed Zuleika the hole in the wall, and begged her to come often to her bed-room window, that she might see her and make signals to her. By and bye the parrot came back, and said it was time to go, and Zuleika, after many kisses, returned as she came.

The ransom of the city was so large that it took a good many days to collect it; for many of the citizens tried to conceal their valuables, and it took the king's officers a long time to search all the houses of the city.

All this time the princess passed in her little chamber at the top of the minaret, with her three birds. She often sent the daws with little notes and messages to Zuleika, who generally sat in the window

of her bedroom, where the princess could see her through the hole she had made in the wall, and through which she could put out her hands and talk to Zuleika with her fingers, as well as the distance would allow, without any other person being able to see her hands, which would have endangered her being discovered, but the ivy covered the minaret so thickly that the hole in the wall could not be seen from any other point than Zuleika's window. The three birds were also a good deal occupied in bringing their mistress provisions from Zuleika, who was not allowed to repeat her visit for two or three days, for fear of discovery. Her next visit to the minaret was late at night, because she had to wait till the moon was gone down, and she and the princess had so much to say to one another that it was almost morning before they parted, and the princess was so sleepy that she forgot to draw up the rope-ladder again after Zuleika's departure. The next morning, the parrot awoke before her, and having sent the daws off in search of intelligence to the Cashmerian camp, she herself flew to the cadi's house to get her mistress's breakfast. The parrot had not been long away when the

princess was awakened by a horrid laugh, which sounded close to her, and she was struck with terror when she saw coming up through the opening which led to the stairs, a head and shoulders. She knew the face too well; it was that of the spiteful slave-girl, who had attempted to betray her to the officers when they searched the cadi's house, and who had always been her enemy.

"Ha, ha! my fine parrot-girl," cried she, "I have found you out, have I? I will soon deliver you to those that will be glad to get you, and who will give me a good reward, too!" She then sprang into the chamber, and before the princess had recovered from her amazement, she seized her and bound her hand and foot with her own scarf, which she tore in two for the purpose, and then saying, "I think you will hardly be able to escape again before I return," she went down the rope-ladder, and as soon as she reached the ground, with a violent jerk she pulled it from the nail to which it was fastened above, and down it fell through the trap door. The spiteful slave gathered up the rope-ladder, and carried it away with her in great haste, leaving the princess lying helpless at the



top of the minaret, and without any means of getting down to escape, even if she had not been bound hand and foot. How the slave-girl came to discover her was thus:—She herself had managed to escape that very night from the building in which the slaves who had been seized to make up the ransom, were kept, and had found her way to the ruined mosque, in hopes of being able to conceal herself there. Finding the

rope-ladder hanging down inside the minaret, she climbed up to see where it led to, and finding the princess asleep, it immediately came into her head to betray her to the king's officers, for she not only hated her out of jealousy, but she knew that a reward was offered for all runaway slaves; and that if she delivered up so valuable a slave as the princess, she should not only be forgiven herself for running away, but

probably be set at liberty besides by way of reward.

The slave-girl never stopped till she came to the building where her fellow slaves were confined, and going straight to the gate, she desired the porter to take her to the keeper of the slaves. When she appeared before him, he began to threaten her with punishment for running away, but she interrupted him and said, "What will you give me if I find you a runaway slave worth one hundred pieces of gold?" "If you can do that," said the keeper, "you shall be set free yourself, and have five pieces of gold; but if you deceive me you shall be beaten on the soles of your feet till you can neither walk nor stand." "I consent," said the girl, "but there is no time to be lost; come with me, and bring a ladder with you as long as this rope-ladder which you see, and I will deliver into your hands the favourite slave of the *cadi's* wife, who is well worth the money I mentioned." The keeper immediately sent two or three soldiers with a ladder to accompany the girl, who brought them straight to the foot of the minaret. The ladder was then raised, and one of the soldiers went up, but he found the chamber empty, and no traces of the princess except a few articles of furniture with which Zuleika had supplied her, and the fragments of her scarf, which appeared all torn to pieces, and stained with blood in several places. This the man brought down with him, and after searching all the ruins in vain, they returned to the keeper of the slaves, who was greatly enraged, and ordered the spiteful slave to be beaten on the soles of her feet for deceiving him; but she cried out that she had not deceived him, and said that if the *cadi's* house was searched again, the parrot-girl would be sure to be found, as she could not have had time to go far, and would certainly take refuge there in whatever manner she had escaped. While this was going on, the king himself came to the slave prison, to see how many had been collected, and asking what was the matter, the keeper told him all that had happened. The king was very angry when he heard that the *cadi's* slave had been concealed, and swore that unless she was found his own daughter Zuleika should be seized in her place; and he immediately sent an officer of his guard and a number of soldiers

to search for the princess, and if they could not find her they were ordered to seize Zuleika instead. Accordingly, they went at once to the *cadi's* house, and searched it and the gardens thoroughly, but no princess could they find. Zuleika and her mother were much alarmed, fearing that the princess's retreat in the minaret might be discovered; but they soon found out, from what the officer said, that it had been searched already without finding her; and though this relieved their fears in some degree, they were greatly troubled to think what could have become of her, especially when he showed them the bloody pieces of her scarf. But what was their dismay when the officer declared he had orders to seize Zuleika, and take her away as a slave; and in spite of the cries and tears of both mother and daughter, she was carried off to the slave prison! As she passed through the court-yard to her cell, she saw the spiteful slave-girl led away by two of the attendants to receive the punishment her wickedness so richly deserved, though she was unjustly sentenced to it by the keeper of the slaves.

How it came to pass that the princess was not found in the minaret where she had been left bound hand and foot was thus. As she lay helpless on the floor she saw a pair of great staring eyes looking at her through the hole in the wall, through which she used to watch Zuleika's window. At first she was frightened, but in a moment she perceived it was the great owl, who was perched amongst some ivy outside, and was looking through the hole. She immediately bethought herself of the talisman, and managed to lift her fastened hands up so as to present the ring to the sight of the owl, and cried out, "Oh, owl! owl! help me for the sake of this!" The owl no sooner saw the talisman and heard these words, than he came to the princess and asked what were her commands. "Unbind my hands and feet," said she, "if you can." The owl could not untie the pieces of scarf that bound her: but with his strong, hooked bill and sharp claws he tore them off, and in so doing he could not help slightly wounding the princess, which caused the stains of blood on the pieces of scarf found by the soldier who climbed up in search of her. No sooner was she free, than she looked round for some means of escape,

but there were none (the ladder being gone) unless she could jump down to the ground, and the minaret was much too high for her to venture so desperate a leap. "Oh, owl! owl!" cried she again, "cannot you help me to get down from this place, before my cruel enemy returns?" The owl was one of that sort almost as large as an eagle, but of course he was not strong enough to support the weight of the princess in the air, or he would have carried her down to the ground, so he replied,



"Wait a moment, fair princess, and I will call my wife, who is taking her morning's sleep amongst the ruins close by, and I think we two together can give you support enough with our wings to bring you safely to the ground." Then going out to the balcony he screeched in his shrillest tones to his wife to come and help him, till all the ruins echoed: and presently a great female owl came flitting to the balcony, and said, "What is the matter, my lord? why have you awakened me at this time of day?" The he-owl then answered by pointing with his bill to the talisman on the princess's finger, who had followed him to the balcony, and addressing her said, "There is no time to be lost. Take firm hold of my legs with one hand, and of my wife's legs with the other, and throw yourself boldly from the balcony upon that leafy bush below; we can support you with our wings enough to break your fall." No sooner said than done. The princess

grasped the legs of the friendly owls, and threw herself from the balcony; down they went all three with a tremendous rushing of wings, and the princess fell on the springy branches of the bush without receiving any hurt at all, and letting go the legs of the owls they flew up again to the ruin, while she scrambled through the branches to the ground. As soon as she was clear of the bush, she looked about to see which way she had better go to escape the danger of pursuit, when she caught sight of the soldiers, who were just coming towards the ruin to take her. Fortunately, they could not see her; and she immediately darted away on the opposite side to that by which they were coming, and keeping out of sight, she ran with all her speed towards a little winding lane which she saw before her, with garden walls on each side of it. She had ran some way up this lane, when just as she came near a door in the left-hand wall, it was slowly and cautiously opened, and she had but just time to hide herself behind a fig-tree which grew out of the wall, when she saw a woman slave come out of the door, and after looking up and down the lane, walk rapidly up it. As soon as she was out of sight, the princess came from behind the fig-tree, and as she passed the door, seeing that it was not quite shut, she pushed it cautiously open and peeped in, and seeing that within was a large garden, closely planted, and that nobody was in sight, she thought she should be safer if she could hide herself there for the present, than if she went she knew not where up the lane. So she went into the garden, and leaving the door as she found it, she hastened to conceal herself in the nearest clump of trees. She had hardly done so, when she heard the door shut, and peeping out, she saw the same slave, who had just returned, bolt the door and proceed towards the house, of which she could see the roof at the other end of the garden. She now felt herself comparatively safe; but to be safer still, she climbed up into a large cypress-tree, the thick foliage of which completely concealed her, and there she determined to wait till night, and then to endeavour to reach the cadî's house, where she was sure Zuleika and her mother would give her protection if they could. Indeed, she had nowhere else to go to.

(To be continued.)

65—French Grammar. J. C.—Cobbet's *French Grammar* may be obtained through any bookseller.

66—Geology. M. C.—This name is derived from two Greek terms—*geo*, the earth, and *logos*, a discourse.

67—Coral. T.—This is obtained in the Mediterranean, about Sicily, Majorca, and Minorca, the Red Sea, off the coast of Africa, in the South Seas, &c.

68—Painted Rooms. S.—The offensive smell of rooms newly painted may, it is said, be removed by simply placing therein, for a night, a bucket of water with some hay in it.

69—Agglomeration. —An Inquiring Pupil.—This word is derived from the Latin, *agor ad*, to or for a purpose, and *glomero*, to gather into a heap.

70—Change. J. S.—“Who is the author of the two celebrated lines I have so often seen quoted:—

“Men change with fortune, manners change with climes,
Tenets with books, and principles with times.”

[Pope.]

71—Bye-law. C. M.—In legal phraseology this signifies a private law, made by those duly authorized by charter, custom, or prescription; but they must be consonant to the public laws and statutes, and for the common benefit.

72—Coats of Arms. L. D. E.—These became hereditary in families at the latter end of the twelfth century. They took their rise from the knights painting their banners with different figures to distinguish them in the Crusades.

73—Sleep. H. L.—It does not come within our province here to explain the nature of sleep, its causes, &c. We would refer our pupils to *The Philosophy of Sleep*, by Dr. Robert Macnish, LL.D., published in 1834.

74—Cod-liver Oil. H. M., S. H., A. &c.—A medical correspondent says, “I have no hesitation in giving a positive opinion in favour of the beneficial effects of cod-liver oil. Bitter orange wine is a pleasant medium of taking it, but it is by no means unpleasant to our palate, when combined with a little salt.”

75—Profession of a Lawyer. S. L.—We shall in time answer all the questions, in a paper on “Lawyers” in our *Guide to the Professions*. This series—retarded by unexpected difficulties, now removed—will be regularly continued henceforward. The “Clergyman” is given in this number, and will be followed by the biography of one who has been an honour to the clerical profession—the Rev. George Crabbe, the poet.

76—Kaleidoscope. G. L. R.—“From what is the term Kaleidoscope derived? Who was the inventor? and what is the object of this instrument?”—This name is derived from the Greek, and signifies literally, “beautiful forms, to see.” It was invented by Dr. Brewster, of Edinburgh, and is intended to assist jewellers, glass-painters, and other ornamental artists, in the formation of patterns, of which it produces an infinite number.

77—True Friendship. H. S.—“In what manner may true friendship be defined?”—The existence of real friendship is proved where each seeks to benefit and give the other pleasure; and the effect of this is to lead a man out of himself, and thus to love himself less. An evil-disposed man, who is, and must be, a selfish being, cannot reciprocate true friendship, for the reason that he cannot love anything out of himself.

78—Setting in the New Year. This custom in the North of England is as follows:—On New Year's morning, the more superstitious people will not allow a man to enter first into their houses unless he has black hair; and no woman whatever is permitted to go in first on any account. But if a man with black hair comes and says, “I wish you a merry Christmas, and a happy New Year,” he generally gets a welcome and some beer.—S. H.

79—Ruminating Animals. F.—“Which are the quadrupeds that come under the description of ruminating animals, and what is the meaning of this term?”—The *ruminantia* are oxen, sheep, deer, goats, hares, and squirrels. Rumination consists in a power of laying aside the food for a time, in a receptacle adapted for it, and afterwards bringing it back into the mouth, and masticating it a second time.

80—Insects. B. T.—“As I am forming a collection of insects, I should be glad, Mr. Editor, if you will tell me the best places for obtaining them, &c.” Insects are always most abundant in that district which enjoys a warm, equable temperature, and a dry and kindly soil; but the greatest variety will ever be found in that which possesses a great diversity of soil, and consequently rich vegetation. In the woods, the oak, elm, poplar, linn, willow, birch, and hazle, and the saw and Scotch fir when in flower, are the most prolific trees; hedge-banks, ditch-banks, forest glades, commons, lanes, heaths, and marshes, covered with long waving grass, rank vegetation, and gaudy wild flowers, also afford large supplies.

81—Perseverance in Seeking Knowledge. E. P.—“Which is the *easiest* method of acquiring modern languages?”—Our correspondent must be aware that there is no royal road to learning. Many and arduous are the difficulties to be overcome by the student in his research after knowledge; and however modern arts and inventions may increase our physical comforts and conveniences, our minds must still undergo the same toilsome process to attain excellence, that others have passed through before us. The greatest men of all ages have been hard-workers, such as Demosthenes, Julius Cæsar, Henry the Fourth of France, Lord Bacon, Sir Isaac Newton, Franklin, and Washington. Our friend, E. P., should rather *seek* than avoid the difficulties that beset study, and strive manfully to master them.

82—Geology and Religion. M. G. R.—“I have met with a passage in Cowper's *Task*, which seems to intimate that the study of Geology is hostile to religion; he addresses the followers of this science as those who

‘Drill and bore
The solid earth, and from the strata there
Extract a register, by which we learn
That He who made it, and reveal'd its date
To Moses, was mistaken in its age.’

Now, Mr. Editor, I should like to know whether there is any foundation for this charge.”—Our correspondent must be aware, that since the days of the amiable poet to whose works he has alluded, most valuable and interesting researches have been made in geology, which prove the greatness and goodness of the Almighty Creator of the universe. The prejudices that formerly existed against this science, have been overcome by the important development it has given to industry. True Religion feels that she has nothing to fear from the utmost hardihood of research. It is fixed upon a rock that can never be shaken.

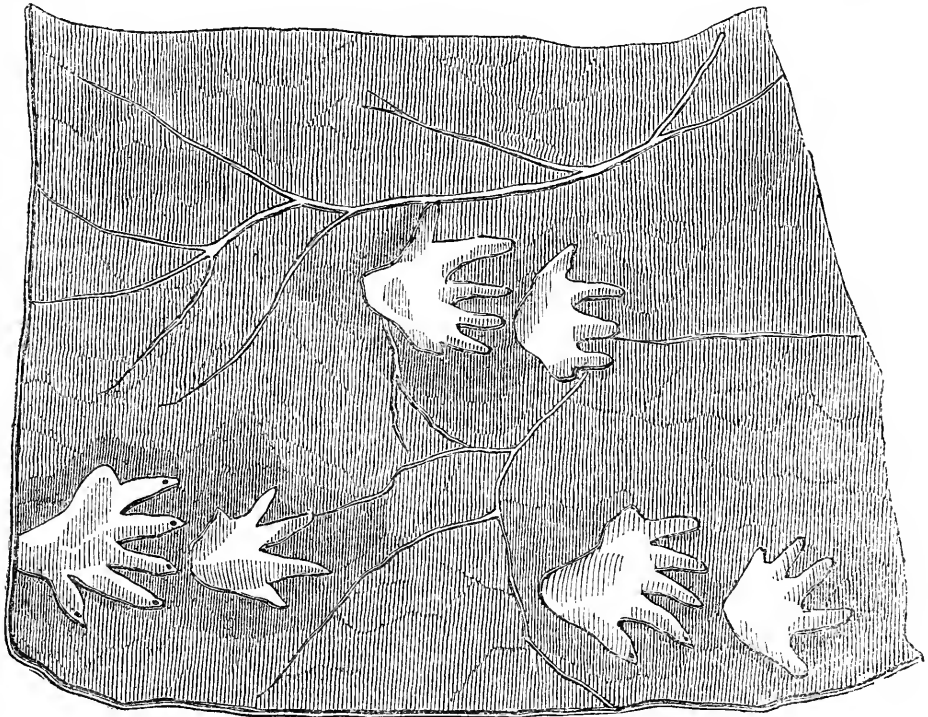
83—Steam.—We do not exactly understand the questions of J. S. Surely every one knows what steam is; that it is visible, and that the vapour arising from the safety-valve of a boiler, when the weight is lifted, is steam. But perhaps our correspondent has not rightly expressed his wishes. We will endeavour, therefore, to meet his wants by a few general words on the subject. First, let us show why steam, which is the vapour arising from moist, liquid bodies, when subjected to heat, and which generally refers to the vapour of water, is visible to the eye. Like other gases, it is transparent and colourless, but it is always in a state of partial liquifaction, and enters small vessels of water enclosing steam, which vessels reflect the light. That is why we see steam. Then as to the colours. From the great number of these vesicles, the light which they reflect or transmit, coming to the eye from all angles of incidence, and being a combination of the primary coloured rays, is white, and is now in the form of a cascade. It is when water reaches boiling point that it passes off into steam, being incapable of a higher heat, and occupying after that change a space 1700 times larger than before. This boiling point varies according to the pressure of the atmosphere. At the ordinary pressure (30 inches of the barometer) it boils at 212° ; but on ascending higher and higher up a mountain, a less and less degree of heat will produce the same result.

84—Greek Testaments.—As I have frequently had occasion to refer to the Greek Testaments alluded to by W. H. W., in vol. iii., Appendix 53, page 9, I can perhaps supply all the information he needs. Mr. Bloomfield's has been long before the public, and is extensively used as a class book by college students. Without displaying very high scholarship, it is yet extremely useful, as containing a laborious compilation of what is most to the point in the commentaries of writers of all ages, upon the sacred text. A fair character of the work will be found in the last volume of *Horne's Introduction to the Scriptures*. Mr. Alford's Greek Testament, the first volume only of which is yet out, is the only *critical* Greek Testament, with English notes, which has yet been published in England. It displays profound scholarship, and an extensive acquaintance with the old Fathers, and ancient and modern commentators. By the term "the only critical," I mean that it is the only one in which the editor's chief strength and resources have been spent in settling the state of the text, showing in full the evidence for and against every sentence and syllable, the genuineness of which has been called in question. There are, likewise, "a Digest of Various Readings, Marginal References to verbal and idiomatic usage; Prolegomena, and a Critical and Exegetical Commentary." The Prolegomena on the writers of the Gospels, &c., and the Commentary, are of very high character. Serious charges have, however, been made against Mr. Alford by various writers, to some of which he has published an answer. I would add that, for a person in W. H. W.'s situation, there can be no more useful commentary than the original authorities from which all modern Biblical interpreters derive their stores, viz.:—First, Josephus; second, the Fathers of the first three centuries; third Pagan writers of the same period, as, Juvenal, Martial, Tacitus, Pliny, Suetonius, &c.—Coll. S. S. Trin. Cant., DISCIPULUS.

85—Movement of Camphor in Warm Water.—"A Correspondent at page 9 of the Appendix, No. 50, vol. iii., inquires the reason *why a piece of camphor, in warm water, moves to and fro?* The experiments which I have made, and the results I have observed, prove the fact, that if thin shavings of camphor be thrown on *clean* water, a progressive and rotatory motion will be instantly acquired; but if the water be greasy, or touched with any substance of an oily nature, the strips of this highly volatile substance will be immediately paralyzed, and remain at rest. The reason of this curious phenomenon will be better understood if I refer the reader to that simple machine, called Barker's mill, for an illustration. I will state, for the benefit of those who forget the instrument, that it is a piece of tubing, in the shape of a T inverted, with a hole on alternate sides of the cross-piece. The water, pouring down the perpendicular column, passes into the transverse-piece, presses *equally* on every part of this portion of the machine; but having found an outlet where the holes are made, presses less at this point than anywhere else, which circumstance gives it a rotatory motion. Having premised thus far, let the camphor be thrown into the water, and observe the result. It emits its volatile constituents instantaneously, in a similar manner as Barker's mill ejects its waters, and thereby caused the rotatory motion so observable. The *currents* given out by the camphor can easily be seen by the aid of a microscope; and if carefully watched, the corners of the camphor will throw out longer and stronger currents than any other point. This all occurs in cold water, but if the *pure* water be heated to 150° , the gyrations will be increased in velocity, but they will not last as long as when in cold water. I need scarcely add, that when all the volatile gas of the camphor has dissipated, motion ceases—as the reader can easily prove, and the inquirer already knows, if he experimented sufficiently upon it. The microscope will also exhibit to the experimentalist, that a single drop of oil, let fall on the liquid, will instantly spread itself over the whole of the water's surface, and, according to the principle of attraction, will be thicker round the piece of camphor than on the surrounding level. The small apertures, which an instant before threw out their jet of gas, are thus stopped up by the oil, and hence the movements cease. Another example of 'oil stilling the troubled waters,' but not on the same principle, is here shown. Although a chemical change is taking place, yet we see the movement is made by mechanical means. Pieces of cork steeped in ether for a couple of days, in a closed bottle, will rotate in a similar manner as the camphor; but will cease when the ether has entirely left. The same reasoning and observations will apply to this, as well as any other *like* experiment. Doctor Barker invented the simple machine above alluded to about the close of the seventeenth century, and a full description, very simply told, will be found in page 178 of the first series of the *Boy's Book of Science*. It will be seen under the head of 'Hydraulics' in many scientific treatises, as this 'centrifugal mill,' as it is called, illustrates the force of water as a moving power, as well as a change of rectilinear motion into centrifugal. Euler and Bernoulli devoted a great portion of their valuable time to its theoretical investigation."—J. J. L.

POPULAR GEOLOGY.

CHAPTER VIII.—SECONDARY STRATA: THE COAL MEASURES COMPLETED.

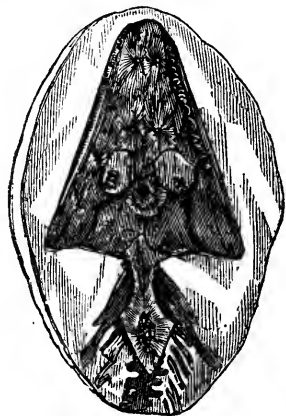


REPTILE FOOT-PRINTS.

First appearance on the Globe of Land Animals.—With some such feeling as Robinson Crusoe gazed upon the unknown footsteps in the sand of his desert island, did geological observers behold the mysterious marks shown in the above engraving, which were found impressed upon certain pieces of sandstone in some of the Coal measures of America within the last few years. Up to the time of these discoveries, the animal life of the era appeared to be confined, as before, to the limits of the marine world, and that life on a greatly reduced scale as regards abundance. Some estuary shells, some also belonging to the depths of the sea, a few species of fishes, chiefly Sauroids, (found in the shales of the system), developed in certain cases to an enormous size—this was nearly all. As to the zoophytes and crinoidea, which were so abundant in the preceding Mountain limestone, they had now altogether disappeared.

Some faint traces, it is true, had been lighted on at last, of the appearance in creation of air-breathing animals. Certain fossil beetles were found in the coal-field of Coalbrook Dale; “a scorpion-like creature,” a moth, and a land-crab, were also presumed to be discovered. But our own time was to furnish new and most interesting additions. In 1844, Dr. King, of America, published an account of certain marks which he had found in the lower surface of slabs of sandstone, which slabs rested on thin layers of a fine unctuous clay. With equal discrimination and courage, he soon saw, and announced to the world that they were the footsteps of a reptile, that had walked over what was then the sands of some sea-shore. The doctor traced no less than twenty-three of these footsteps in the same quarry; and he considered that they were all left by one

animal. Everywhere the marks showed a double row of tracks, the fall, in fact; at regular intervals, of a pair of feet. That this was an air-breathing, land-walking animal, is considered to be proved by the depth of the impressions; under water, its weight would have been insufficient to have left such tokens of its presence. The cracks in the



sandstone also show that the material had been exposed to the air and sun, and so had dried and shrunk. But as if to make quite clear and certain a fact so interesting in geological science, there was discovered the same year the skeleton of a reptile, in the Coal measures of Rhenish Bavaria. This animal is supposed to have been related to the salamanders. In 1847, three other skeletons of animals, presumed to be allied to the crocodiles and lizards, were dug up at the village of Lebach, between Strasburg and Treves. The largest of these must have been three-and-a-half feet long: its teeth seem to have been of an advanced character in animal development. The smallest of the three is here represented, half the natural size. The creature had evidently weak limbs, such as could serve only to swim and creep. Lastly, in 1849, the footsteps of a large reptile were discovered in the *lowest* beds of the coal formation at Pitts-

ville, near Philadelphia. This, then, is certainly the oldest inhabitant of the reptile class yet known in geological history. And so far as present facts go, we may presume that this was the period of the first appearance of air-breathing terrestrial animals on the globe.

Coal-beds do not entirely cease with the era.—Although coal-beds are not unknown in connexion with a later era, such facts are but special exceptions to the general rule, which confines their production to the carboniferous period. Over the greater part of the earth's crust, the conditions that were so favourable for the production of a luxuriant vegetation, ceased with the termination of the era; and where we do find later coal-beds, we may conclude that those favourable conditions had there existed proportionally longer.

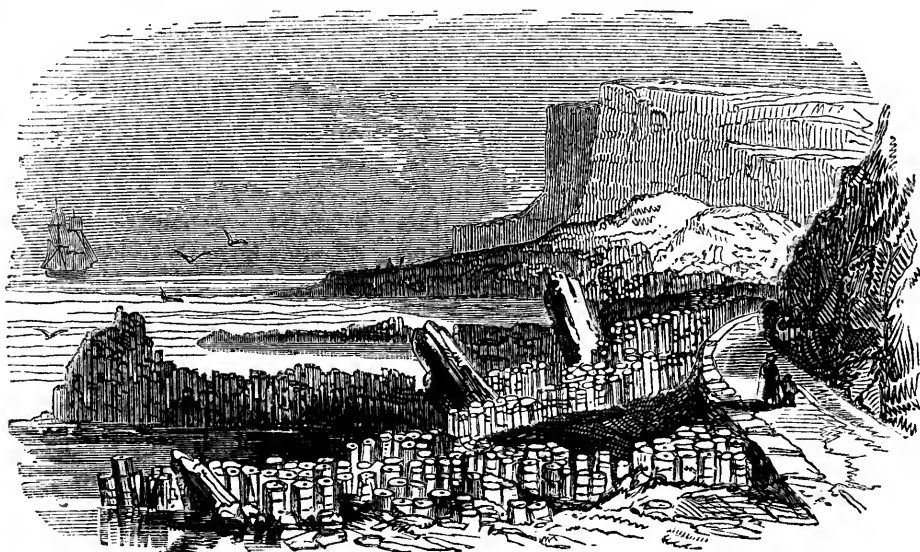
Proportions of actual Coal veins to the Coal Strata.—The depths of the coal, as compared with those of the other strata in which they are imbedded, are very small. In the north of England, for example, the entire series of strata are estimated to extend to about three thousand feet, while, if we reckon all together the respective thickness of each of the twenty or thirty coal seams they enclose, they will not exceed sixty feet. In South Wales the Coal measures are of far greater depth, reaching the extraordinary thickness of twelve thousand feet, the result, says Sir Charles Lyell, "of fifty or even a hundred ancient forests buried one above another, with the roots of trees still in their original position, and with some of the trunks still remaining erect." We have more than once spoken of the awful ideas of time which geology gives us; will any of our readers try to calculate for themselves, however roughly, on the preceding data, how long it must have taken to form the South Wales Coal measures: and then to estimate, if their fortitude will extend so far, the duration of the period that shall include the whole of the geological systems? They will then see that Geology is to time, what Astronomy is to space. Both indicate the unfathomable. Both carry man to the extremest verge of his intellectual powers, and enable him, as it were, to look over trembling into the fearful abyss beyond. Both carry him at last in profound humility to God, whose help we require to enable us to stand fast amid such sublime phenomena.

Disturbances at the close of the period of the Coal measures.—The period of the Coal measures, evidently, then, closed in some abrupt manner. What were the causes? Doubtless, volcanic action. Everywhere through the system we see the tokens of the presence of mighty disturbing powers. For instance, the normal position of the coal-beds appears to be that of hollow basins, following the curve of the bottoms of the seas in which their materials were deposited. Everywhere these basins are broken up into

pieces, some of which have been cast up on edge, while others have been greatly depressed. There is a famous slip of this kind in the Newcastle coal-field, known as the "Ninety fathom hitch," where one part of the same original basin lies no less than 450 feet lower than the other part. But such hitches are known to extend to a thousand or twelve hundred feet. We shall see that all this is owing to volcanic action, when we examine what are

The Igneous Rocks associated with the Coal measures.—These comprise greenstones (popularly known also as whinstones), clinkstones, basalts, and trap-tuffs. All these belong to what is called, geologically, *Trap*. The trap rocks of this era are distinguishable from those of other eras, by their darker colours, greater proportion of bitumen in their composition, and by the prevalence of basalts, and trap-tuffs, containing limestone, sandstone, and shale, in fragments. Their positions may be described either as arising from a movement originally of a disruptive elevating character, as exhibited in the hills of the Mountain limestone, and the rounded heights and irregular cones of the Coal measures; or as overlying, where basalt and greenstone occurs, looking as though primarily poured forth in a liquid state, or where trap-tuffs are found strewn about with all the appearances of having been vomited forth by volcanos in the form of ashes, dust, or cinders; or, lastly, as interstratified, a position frequently occupied by the trap rocks, and which implies that they were of volcanic origin, and had been gradually covered by sedimentary deposits.

The Trap rocks of the Coal measures.—Can these varying kinds of rock have all issued from the same volcanic masses of heated and fluid matter? Experiment gives the following answer:—All the trap rocks may be fused into one homogeneous mass, and then made to assume the varying forms we have already described, by mere differences accompanying the process of cooling. Let us illustrate these facts by the formation of basalt, the most interesting of all the trap rocks. Put a number of round pellets of plastic clay or putty into a vessel; then gently press upon them, and they will take the shape of five or six-sided columns, precisely like those of basalt in the wonderful natural



GIANT'S CAUSEWAY.

structures of Staffa, and the Giant's Causeway. The greatest known mass of basalt is that of the Deccan, in the East Indies, where it constitutes the surface of the earth for many thousand square miles. The traveller there often sees in the distance rising before him,

masses of broken columns, which induce him to believe he is approaching some important human structures, ruinous or otherwise. By the sea-side such deceptive appearances are even still more common, especially where the columns are jointed, so as to seem built of separate stones. The dimensions of these columns are sometimes most extraordinary. Some have been measured at Fairhead (the Giant's Causeway), which were found to be above a hundred yards high, while each of the sides were five feet broad. Was not the idea of the clustered columns or piers of our cathedrals originally derived from this source?

Distribution &c., of Coal.—Coal is largely distributed over the world. Independent of its abundance in our own country, it is found in France, Spain, Germany, Sweden, Russia, Hindostan, Australia, New Zealand, China, the Persian Gulf, Melville Island, Nova Scotia, Cape Breton, the United States, Chili, &c. &c. While thus adding to the wealth of many localities, it by no means conduces to their beauty, for

The Scenery of Coal Districts is universally tame, level, bleak, and unfertile, as though nature had been aware that in extracting the treasures from below we should only have deformed and abused her gifts of whatever might have been most beautiful in scenery above, by the many useful, but far from ornamental contrivances and arrangements for the exhumation and transmission of coal, that are found at all times around coal mines.

The Uses of Coal, &c. need scarcely to be spoken of, they are so well known and appreciated. Our position as a nation speaks trumpet-tongued as to what we owe to coal. With it we fuse our metals, produce steam, light our streets and shops, &c., with gas, warm our houses, and prepare our food. The annual consumption in these islands alone amounts, we believe, to about thirty millions of tons annually; and as though that drain were not sufficient, we export some three millions more. How long will our coal mines stand this enormous demand? They are far from inexhaustible. Many persons of scientific attainments have looked at this matter with some interest, not to say anxiety. The conclusion they come to is, that a supply may be depended upon, possibly, for two thousand years—a long period in the history of human civilisation, as we understand it, yet but a mere span, when looked at from the geological point of sight. But we may be quite certain that science, every day growing more fertile of practical benefits to man, will, long before the expiration of that time, have found much superior modes of obtaining all that coal can give us. Even now, we hear almost daily of new discoveries in heating, lighting, and motive-power, that happily promise to supersede the three great branches of usefulness that make coal so precious to us at present.

We may add, in concluding this chapter, that among the many felicities of natural arrangement, perhaps we can no where find one more striking than that which the Coal measures present—of the abundance all nearly together of the three articles, coal, lime, and iron-stone, which are so indispensable to the production of the metal iron, in a form fitted for the fabrication of tools, machines, and structures of all kinds.



THE COW-TREE.—On the parched side of a rock on the mountain of Venezuela, grows a tree with a dry and leathery foliage, its large woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower, its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the blacks and natives are seen coming from all parts provided with large bowls to receive the milk, which grows yellow and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd who is distributing the milk of his flock. It is named the *palo de vaca*, or cow-tree.

A LEAF FROM A TEACHER'S NOTE-BOOK.

WHEN a class is dull, or any of its members manifest a want of interest, the teacher may easily excite them by throwing out suggestions here and there, which the study of the lessons has awakened in his own mind. They may be explanatory, amusing, or moral, as the case may require.

The following notes were made in 1834, and will illustrate my meaning.

The following remarks were made to a class in Chemistry:—

Black bodies, you see, are like ready memories; they heat quick and cool quick.

Since air, perfectly transparent, is colourless, you see that colour is not essential to the existence of matter.

Your author says a substance is white because it reflects all the rays, and in another place he says bodies that are white reflect all the rays. This is reasoning in a circle.

If smooth surfaces are the best reflectors of light, ought not every smooth surface to be white?

You call a mirror a *looking* glass; I think you ought to drop the *g*, and call it a *look-in* glass.

Plating metals with gold and silver is a fine specimen of outside show. Such things may be beautiful to the eye, but do not wear well. If you see a person who appears well, do not confide in him till you have ascertained whether he is made of pure metal, or is only plated.

Oxalic acid, the sourest substance known, may be made from loaf-sugar. Remember, the sweetest things may become the sourest.

The following suggestions were made to a class in Mental Philosophy:—

The difference between consciousness and reflection seems to be this: the former is involuntary, the latter voluntary.

Active and passive emotions, though very different, go hand in hand; thus, pity is a passive emotion, but it is always accompanied by a *desire* to relieve those we pity, which is an active emotion.

Interest in a subject fixes our attention, and if we give our attention to a subject it begets an interest in it; so that interest and attention have a reciprocal influence upon each other.

Do you not know what reflection is? It can be easily understood by *reflection*.

In order to retain a new idea, you must chain it by association to one you have secured and *tamed*. Which, think you, requires the most labour—to get a new idea, or to keep it?

Our perceptions depend on the condition of the nerves; when the hand is cold, you do not readily distinguish between what is rough and smooth.

In high mental excitement the memory is ready and the imagination lively, but the control of the will is diminished, and the judgment less sound. This you see in persons speaking under great excitement.

Children when growing fast are usually less apt scholars. The mind is more vigorous in slow growing bodies.

To a class in Natural Philosophy the following suggestions and remarks were made:—

The effect of light and air on the sap of vegetables may be inferred from the fact, that the sap in the stem and leaves of the common milk-weed is white; in the roots it has the appearance of water. The sap ascending in the woody part of large weeds will be seen to be watery, while the sap descending in the bark is often milky. Examine for yourselves. Cut out a piece of bark, an inch square, on the limb of an apple-tree, a maple, or any other tree, in May or June, and watch the change that will take place during the summer. If you do not injure the wood, you will find an accumulation of matter along the upper edge of the square, which will extend downward till the square is covered. You will see, by such experiments, that the sap descends in the bark.

If light is absorbed by an opaque body, and is material, why does not the body become luminous? Some say that opaque bodies exposed for awhile to a bright light, and removed suddenly to a dark closet, will be visible by reason of radiated light. Try the experiment for yourselves, and then you will know whether to believe it or not.

If you pound chalk, salt, brick, and many other substances, it destroys the cohesive attraction of the particles, and reduces it to a powder; but if you pound iron or gold the cohesion is not destroyed. There is a difference, then, in the cohesion of chalk and iron. What is the cause of

it? Wood can be more easily split than broken, showing that the cohesion of the fibres is not so great as the cohesion of particles composing its fibres. We may suppose that wood is composed of particles that are concave-convex, like tea-saucers, so that the particles of a column present to each other a larger surface than do the particles of adjacent columns, and can be split more easily than broken. Iron may be supposed to be composed of cubic atoms, having the attraction equal on all sides, and therefore it cannot be broken in one direction more easily than another. The original particles of chalk may be supposed to be globular, and to touch each other only at points, and hence easily broken in any direction. I mention this to show that the different degrees of cohesive attraction render it probable that the original particles of matter are different.

Elasticity seems to depend on a due proportion between attraction and porosity. If a body is perfectly compact, having no pores, then if you attempt to bend it, the particles will suffer no compression on the side toward which you try to bend it, and it breaks as glass. If the substance be very porous, and the attraction strong, it will bend without breaking, as a stick of whalebone; or if it be compressed, it will restore itself, as an India-rubber ball. If it be porous, but the cohesive attraction slight, it may be easily compressed, as a ball of butter, but will not restore itself to its former shape.

The following brief remarks were also made about Human Nature:—

It is often said that a knowledge of human nature is very useful to every one, and especially to a teacher. Do you know what it is? Iron, as indeed every substance, has a nature peculiar to itself. If you know the nature of one piece of iron, or of one grain of arsenic, you know the nature of every piece of iron and every grain of arsenic. There is a common nature in man, and if you know yourselves perfectly, you know the nature of mankind generally; or if you know the principles of this common nature in others, you may know that you have it. You do not like to hear others scold and fret, and in like manner others do not like to hear you scold and fret.—S. W.

BAD EFFECTS OF MISCELLANEOUS READING.

OF two young men of equal capacity, suppose that one occupies himself for a certain period in light reading of a miscellaneous character, and the other devotes the same time to the vigorous study of one or two works requiring close attention and continuous thought—such as Butler's *Analogy*, Smith's *Wealth of Nations*, Locke's *Essay on the Human Understanding*, or Mill's *Logic*—the amount of intellectual benefit derived by the two will be greatly in favour of the latter. The former will have gained merely a crowd of heterogeneous impressions, lying in confused masses in his memory, like the shreds and patches of a rag-bag, while the other will have been through an athletic course of mental discipline, by which every faculty is invigorated.

"Beware of the man of one book," says a Latin proverb. He knows no more than that, but that he knows thoroughly. Let me commend to every young man to form the habit of reading with a definite object, and with a concentrated attention, and not to roam over a library as one strolls through a garden, pitching upon books because there is something taking in their titles, or because you are not content to be entirely ignorant of some things in order that you may know other things well.

It is better to know everything of something, than something of everything. "Study," says Cicero—and no one ever had a better right to define study than he, for no man ever studied harder—"is the intense and assiduous occupation of the mind, applied to some subject with earnest good will." One hour of study is worth a day of listless dawdling over a shelf of books.

NATURAL CARPET.—Extensive conflagrations of shrubs are common in the Pampas of Buenos Ayres and Tucuman, making a splendid appearance by night. With the first shower that falls on the scorched ground, a lovely crop springs up, consisting of *oxalis*, red, yellow, and rose coloured, mingled with different kinds of *amyrrillis*, which spread a carpet of bloom resembling a richly stocked flower-garden.

A FATHER'S ADVICE TO HIS SON.

THE time draws nigh, dear John, that I must go the way from which none returns. I cannot take thee with me; I must leave thee in a world where good counsel is not superabundant. No one is born wise. Time and experience teach us to separate the grain from the chaff. I have seen more of the world than thou. It is not all gold, dear son, that glitters. I have seen many a star from heaven fall, and many a staff on which men have leaned break. Therefore I give thee this advice, the result of my experience.

Attach not thy heart to any transitory thing. The truth comes not to us, dear son; we must seek for it. That which you see, scrutinise carefully; and with regard to things unseen and eternal, rely on the Word of God. Search no one so closely as thyself. Within us dwells the judge who never deceives and whose voice is more to us than the applause of the world, and more than all the wisdom of the Egyptians and Greeks. Resolve, my son, to do nothing to which this voice is opposed. When you think and project, strike on your forehead and ask for His counsel. He speaks at first low, and lisps as an innocent child; but if you honour his innocence he gradually loosens his tongue and speaks more distinctly.

Despise not any religion; it is easy to despise, but it is much better to understand. Uphold truth when thou canst, and be willing for her sake to be hated; but know that thy individual cause is not the cause of truth, and beware that they are not confounded. Do good for thy own satisfaction, and care not what follows. Cause no grey hairs to any one: nevertheless, for the right even grey hairs are to be disregarded.

Help and give willingly when thou hast, and think no more of thyself for it; and if thou hast nothing, let thy hands be ready with a drink of cold water, and esteem thyself for that no less. Say not always what thou knowest, but *know* always what thou sayest. Not the apparently devout, but the truly devout man respect, and go in his ways.

A man who has the fear of God in his

heart, is like the sun that shines and warms, though it does not speak. Do that which is worthy of recompense, and ask none. Reflect daily upon death, and seek the life which is beyond with a cheerful courage; and further, go not out of the world without having testified by some good deed thy love and respect for the Author of Christianity.—*Goethe*.

VEGETABLE INSTINCT.

IF a pan of water be placed within six inches of the stem of a young pumpkin or vegetable marrow, it will, in the course of the night, approach it, and will be found in the morning with one of its leaves on the water. This experiment may be continued nightly until the plant begins to fruit.

If a prop be placed within six inches of a young convolvulus, or scarlet-runner, it will find it, although the prop be shifted daily. If, after it has twined some distance up the prop it be unwound and twined in the opposite direction, it will return to its original position, or die in the attempt; yet notwithstanding, if two of these plants grow near each other; and have no stake around which they can entwine, one of them will alter the direction of its spiral, and they will twine around each other.

Duhamal placed some kidney-beans in a cylinder of moist earth; after a short time they began to germinate, of course sending the plume upwards to the light, and the root down into the soil. After a few days the cylinder was turned one fourth round, and again and again this was repeated, until an entire revolution of the cylinder had been completed. The beans were then taken out of the earth, and it was found that both the plume and radicle had bent to accommodate themselves to every revolution, and the one in its effort to ascend perpendicularly, and the other to descend, had formed a perfect spiral. But although the natural tendency of the roots is downward, if the soil beneath be dry, and damp substances be above, the roots will ascend to reach it.

Other instances could be advanced to show the wonderful instinct of vegetables, but probably the above are sufficient to awaken a spirit of inquiry among our pupils.

COCHINEAL.

THE history of the cochineal insect was for a long time very obscure; and at one time the species employed in commerce was considered a kind of grain. It was not until near the close of the seventeenth century that it was discovered to be of insect origin.

Cochineal insects are natives of Mexico, where they were raised by the Mexican Indians, long before the country was discovered by the Spaniards. It is now cultivated in some of the West India Islands, and in Georgia and South Carolina; but it is in Mexico only that it is raised in sufficient quantities to form an article of commerce. It is most extensively cultivated at Oaxaca, which is one of the most delightful countries in that part of the globe.

This insect is reared on the Indian fig-tree, or nopal, which is a species of cactus. The nopal is a plant consisting of stems, the buds of which are covered with little prickles. These buds expand into wide, thick leaves, which are planted two or three feet from each other, and innoculated with the cochineal.

The natives, where these creatures are produced, raise plantations of the nopal near their dwellings. It grows freely from cuttings; and these are fit to receive the insect after eighteen months. Into a small nest, formed of some thread-like substance, or cottony matter, a few females are placed, about the middle of October. These nests are affixed to the nopal, on the side facing the rising sun.

The eggs are soon laid and hatched; and as each female produces upward of a thousand eggs, a large colony of these little creatures soon spread over the tree. It is said that six generations of them are produced in a single year.

On first leaving the egg the insects of both sexes are quite active, and run about among the leaves and branches of the trees. They are so small, however, at that time, that they cannot be seen without the aid of a microscope. They are flat, ovular, without wings, and with short antennæ, or horns. The females have a small, short, and almost conical beak, placed between the first and second pair of feet, which

contains a sucker. It is by the means of this that they draw forth the juices of the leaves and tender stems.

When the female insect has reached what is called its perfect state, it is filled with a multitude of very minute eggs. Having laid her eggs the female never moves from her place, but dies, and her body becomes a covering for the eggs until they are hatched. When this is done the young insects work their way out, and commence feeding. After a short time their skins harden, and serve as a cocoon. From this appearance they pass into a chrysalis state, and soon after appear as the perfect insect.

The cochineal is first collected about the middle of December. The insects are removed from the nopal with a knife, the edge of which has been blunted, or are carefully brushed off. This labour is performed by the Indian women, who often sit for hours together by the side of a single plant.

The insects are usually killed by the application of heat; sometimes by baking them in ovens. When the cochineal arrives in the market, it is in the form of a small grain, having a convex and a concave side, but with very little resemblance to the body of an insect.

Cochineal is used for dyeing crimson and scarlet, and for making carmine. Cochineal, alone, yields a purple colour, which, by mixing with it a solution of tin in nitro-muriatic acid, may be changed to a most beautiful scarlet. This discovery is said to have been made by the following singular accident:—

A person having placed in his window an extract of cochineal, made with boiling water, for the purpose of filling a thermometer, some nitro-muriatic acid dropped into it from a vial broken by accident, which stood above it. This acid changed the purple dye into a most beautiful dark red. By experiments he soon found that the tin dissolved in the acid caused the change of colour.

An ingenious dyer at Leyden, Holland, brought the discovery to perfection. The secret afterwards became known, and a large dyeing establishment was erected at Paris. These events occurred more than two hundred years ago, and now cochineal is extensively used in Europe and America.

When we study the history of the insect world by which we are surrounded, and learn how much these inferior creatures contribute to our pleasure and comfort, and how they afford us not only materials for our richest clothing, but colours to beautify and adorn it, and our dwellings also, we cannot but feel interested in them, and love to investigate their curious history. Then, too, are we reminded of our many obligations to God for all the creatures which He has made, and which, in some form or other, contribute to our happiness.

INGENUITY OF BIRDS.

THRUSHES feed very much on snails. Having frequently observed some broken snail-shells near two projecting pebbles on a gravel walk, which had a hollow between them, I endeavoured to discover the occasion of their being brought to that situation. At last I saw a thrush fly to the spot, with a snail-shell in his mouth, which he placed between the two stones, and hammered at it with his beak till he had broken it, and was then able to feed on its contents. The bird must have discovered that he could not apply his beak with sufficient force to break the shell when it was rolling about, and he therefore found and made use of a spot which would keep the shell in one position.

When the lapwing wants to procure food, it seeks for a worm's cast, or hole, and stamps the ground by the side of it with its feet, somewhat in the same manner as I have often done when a boy, in order to procure worms for fishing. After doing this for a short time, the bird waits for the issue of the worm from its hole, which, alarmed at the shaking of the ground, endeavours to make its escape, when it is immediately seized, and becomes the prey of the ingenious bird.

The lapwing also frequents the haunts of moles. The animal, when in pursuit of worms, on which it feeds, frightens them, and the worm, in attempting to escape, comes to the surface of the ground, where it is seized by the lapwing. The same mode of alarming his prey has been related of the gull.—*Jesse's Gleanings in Natural History.*

DISCOVERIES OF THE LAST HALF CENTURY.

BEFORE the beginning of this century, what was the printing-press in comparison to what it is now? A few years ago there was not a single printing-press driven by steam; now there is not a paper, with a large circulation, printed without it. From printing 1,000, 2,000, and 4,000 copies per hour, the latest improved press can print 20,000 in that time. In other departments of typography the improvements have been equally striking and beneficial.

Fifteen years ago pins were all made by hand; each was made of more than one piece, and a number of persons were required to finish every one. A single machine now completes the operation from beginning to end; and, in one manufactory, 4,030,000 are finished every day; and the machinery for counting and sticking them in papers is equally ingenious.

In all kinds of machinery for manufacturing textile fabrics, the improvements made during the last half century would require volumes to describe them in all their numberless variations. In weaving, especially, we now behold the most beautiful carpets, with their most intricate patterns, woven by a few rods and cams, without the finger of man touching them after they are set in motion. The rich carpets of Brussels are now made by steam, and iron fingers lap the wires, to raise the figures, with more accuracy and speed than the most skilful weaver.

In chemistry, what discoveries have been made? In fact, the whole science has been remodelled. The discovery of the voltaic battery was to chemistry what a strong man is to a great law-giver in executing his mandates. In the hands of Davy, chemical compounds of what were supposed mere earthy crystals, were resolved into metals in 1808; and since that time the most astonishing progress has been made in the science.

Agricultural chemistry is but a few years old; and bromine, iodine, palladium, rhodium, &c., are discoveries of very late years. The *Animal Chemistry* of Liebig has been but recently given to the world. Cotton and sawdust are now made to propel cannon-balls, and rend rocks by a spark

from a battery. Chloroform has come to the aid of surgery; and arms and limbs are amputated from men and women every day, and they as ignorant of the operation performing on them as the dead in their graves.

Gas-light was unknown in 1800; it was not until two years after this that Murdoch made his first public exhibition at Soho. Since that time, his discovery has encircled the earth; in Europe and America all the principal cities are lighted with it; and even in New Zealand, villages, where no white man had built his residence in 1800, are now illuminated by the same subtle, but beautiful agent of human comfort and happiness.

Who, if he were told, twenty years ago, that the sunlight would be used for a limner's pencil, would have believed it? Not one; and yet this has been done. When M. Daguerre, a distinguished chemist, of Paris, first published in 1839 that he had discovered a method of taking pictures on metal plates by the sun, the public regarded his metal tablets with feelings of wonder.

And if this discovery has not yet produced such important results, nor affected the customs of society so much as the steam-ships and railways, still it is a beautiful and wonderful discovery; and the time may not be far distant when it will be applied to paint the planets as they roll in their courses, and thus impress the warm kiss of the star on the pale cheek of the artist's metallic canvas.

A discovery has also been made by which the colours of nature can be accurately and beautifully transferred to the metallic plates; so that landscapes, and even the beauties of a summer's golden sunset, may be copied with all the natural colours by this new process of Daguerreotyping.

In astronomy the advancement has been equally rapid and wonderful. Mechanics has come to the aid of mathematics; new and powerful telescopes have drawn the stars down to earth, and opened up the secret chambers of Orion to the ken of mortals; and so refined have the disquisitions of philosophy become, that the planet Neptune was discovered before a ray of its light had entered human eye.

As Sir David Brewster has well observed, "By a law of the solar system, just dis-

covered by Daniel Kirkwood, an humble American mechanic, who, like Kepler, struggled to find something new among the arithmetical relations of the planetary elements, we can determine the broken magnitude of the original planet long after it had been shivered to atoms."

There is not a single department in science and art but has been greatly enriched with splendid discoveries during the last fifty years; and those discoveries, although so many are blind to their value, have been the means of conferring great benefits upon all classes.

Look at the simple article of lucifer matches: twenty years ago we knew nothing about their benefits. None but those who were comparatively rich could buy them; and fifteen years ago, a box which now sells for one halfpenny, could not be purchased for less than sixpence.

Blanchard has given to the world a machine, which, by putting a rough block of marble upon a spindle, soon turns it into the likenesses of individuals. Bogardus has invented an engraving machine, which can engrave the finest numbers, and the most beautiful flowers, on metals, with a facility and accuracy which baffles all manual workmanship.

We have now gold and steel pens instead of goose-quills. This is certainly the age of invention. The triumphs of warriors are nought compared with the triumphs of inventors. The iron bridge spanning the sea, the iron ship sailing on the ocean, are greater evidences of mental power than Austerlitz or Waterloo.

And if the last half century has given birth to so many grand discoveries and inventions, is there any reason to doubt that the future may more than outstrip the past. We can see none. Hope is pointing her finger to the year 1900.

DWARF TREE.—Captains King and Fitzroy saw near Cape Horn a tree, which they describe as being only one inch in height, and spreading four or five feet along the ground. In many instances, in ascending the mountains to make observations, the foliage of these dwarf trees, mixed with shrubs, was so dense, that the party crawled or walked over the surface, to pierce through being quite impracticable.

LIFE OF THE REV. GEORGE CRABBE, LL.B.

GEORGE CRABBE was born in 1754, at Aldborough. In his twelfth year he was destined for the medical profession, and for this purpose was removed to a school of some considerable reputation at Stowmarket. He was afterwards apprenticed to a surgeon, near Bury St. Edmonds. In his eighteenth year Crabbe attracted attention by his poetical talents. He engaged himself as assistant to a surgeon at Aldborough; but feeling dissatisfied with the profession he had adopted, he directed his attention to literature as a means of living; and determined to go to London and try his fortune. Money, however, was wanting for this purpose, and his friends, who were poor, were unable to assist him. In this dilemma he wrote to Mr. Dudley North, stating his purpose and requesting the loan of a small sum, and this gentleman kindly advanced Crabbe five pounds. With this he was enabled to seek his fortune in London, where he passed most of his time in study; and subsequently devoted his energies to accomplishing the object of his ambition.

His first attempts to find a publisher for his poems were unsuccessful; but at length he succeeded, and *The Candidate* appeared early in 1780. The bookseller, however, failed, and Crabbe, so far from deriving any benefit from the sale of this work, found himself involved in difficulties. He applied to Lord North and others, but his appeals were unanswered; and at length he was induced to state his case to Edmund Burke. This great statesman at once discovered the worth and talent of the poet, and generously assisted him with his advice and recommendation, besides introducing him to the notice of the most distinguished literary men of the day. Burke also early drew from Crabbe the avowal of his strong partiality for the Church, and exerted himself to procure his admission into holy orders, which occurred in 1781; and he received at once the curacy of Aldborough, his native town.

Such was Crabbe's early career; and it affords an excellent example to youth—proving the value of steady and persevering conduct, and a courage that no difficulties could affect.

Crabbe, by this timely assistance, had escaped the ills of impending poverty; but his means were still scanty. The same noble resolution, however, accompanied him in his new career. The curate's position at Aldborough was anything but satisfactory; and Burke, aware of his position, obtained for him the appointment of domestic chaplain to the Duke of Rutland, and he at once became an inmate of Belvoir Castle. In 1783, he was married to a lady to whom he had been long and fervently attached.

Whatever advantage Crabbe derived from the position he held as chaplain to the Duke of Rutland, he soon felt that his liberty was restrained, and he sought a more humble residence as curate of a neighbouring parish, where he zealously devoted himself to the duties of his profession and those incident to domestic and village life.

Lord Chancellor Thurlow—who had overlooked the poet when he was in difficulties—invited him to breakfast, while Crabbe was staying with Burke, and, at the conclusion of the meal, put a sealed paper into his hands, observing at the same time, "Accept this trifle, sir, and rely upon my embracing an early opportunity to serve you more substantially." This contained a £100 note; and true to his promise, shortly afterwards presented him with two small livings in Dorsetshire; but these were resigned on his receiving the living of Muston, with Allington. In 1813, he lost his wife, and shortly afterwards was appointed to Troubridge, in Wiltshire, which preferment he continued to hold until his death.

The poetic talent of Crabbe—the first latent cause that raised him from a humble station—was of a mixed nature. He did not possess the higher qualities of imagination; but his poems claim attention from the truth with which he has invested them. He has been called the "Teniers of Poetry," exhibiting the common people such as they are to be found in every-day life. His clerical career proved that he was deeply impressed with the responsibility of his situation. His income at Troubridge was about £800 a year, and it enabled him to display the generosity of his disposition. He was extremely moderate in the exaction of his tithes, and when told of defaulters, his usual reply was, "Let it

be, they cannot afford to pay so well as I can to want it." He gave large sums away without any restriction of his bounty; in fact, he was the common refuge of the unhappy. To him it was recommendation enough to be poor and wretched; and this was so well known that he was regularly besieged by mendicants of all grades. Of course, as might naturally be expected, he was often imposed upon; but on discovering this, he merely said, "God forgive them—I do."

He now paid occasional visits to London, where he was welcome, not only among his particular friends, for his reputation was a general passport; and he was not only looked upon with admiration for his talent, but with a peculiar interest, as forming a connecting link between the past—in which he was associated with Burke, Johnson, and other great men of that period,—and a few of the present race, including Roger, Moore, Campbell, Scott, and other celebrities.

He had for many years been subject to attacks of that most painful disorder, tic-doloureux; and latterly these became more frequent, often seizing him as he was performing his duties in church. On the 29th of January, 1832, he caught a sharp cold, accompanied with oppression, pain, and fever. He himself now felt there was no chance of recovery, and he prepared himself accordingly. The pain he endured was excruciating, his great strength of constitution being a principal cause of his sufferings. "A great price to pay for it," he observed, when after more torment than usual, he had exclaimed, "It is shocking!" At length, about one o'clock, on the morning of February the 3rd, 1832, death approached; and a few hours afterwards the poet breathed his last in the presence of his family.

When the event became known, gloom and sorrow pervaded the town. His remains were followed to their last resting-place by a numerous concourse of friends. A monument was raised by subscription to his memory; the sculptor, Baillie, generously contributing the marble. The inscription was extremely simple and unassuming, and concluded with that well-merited tribute to his writings by a brother poet—

"Nature's sternest painter, yet her best."

THE PROFUSION OF LIFE.

BY BARON VON HUMBOLDT.

WHEN the active spirit of man is directed to the investigation of nature, or when in imagination he scans the vast fields of organic creation, among the varied emotions excited in his mind, there is none more profound or vivid than that awakened by the universal profusion of life. Everywhere, even near the ice-bound poles, the air resounds with the song of birds and the busy hum of insects.

Not only the lower strata, in which the denser vapours float, but also the higher and ethereal regions of the air, teem with animal life. Even the unassisted eye shows that life is diffused throughout the whole atmosphere; but the microscope reveals yet greater wonders. Wheel-animalcules are lifted by the winds from the evaporating waters below. Motionless, and to all appearance dead, they float on the breeze, until the dew bears them back to the nourishing earth, to assume new life and motion.

The atmosphere contains countless germs of future formations; eggs of insects, seeds of plants, which, by means of hairy or feathery crowns, are borne forward on their long autumnal journey. Even the vivifying pollen, scattered abroad by the male blossoms, is carried by wind-winged insects over sea and land, to the distant and solitary female plant. Thus, wheresoever the naturalist turns his eye, life, or the germ of life, lies spread before him.

It is still undetermined where life is the most abundant, whether on the earth, or in the fathomless depths of the ocean. In the ocean, gelatinous sea-worms, living and dead, shine like luminous stars, converting, by their phosphorescent light, the green surface of the ocean into one vast sheet of fire. But not alone the depths of ocean, the water, too, of our own swamps and marshes, conceal innumerable worms of wonderful form. Thus are the most hidden recesses of creation replete with life.

Not only is animal life distributed in great abundance throughout our globe, but the vegetable forms, which so thickly cover the earth, reveal to us a luxuriant world of life. But the verdant carpet which Flora spreads over the surface of the earth is not

woven equally in all parts. It is most rich and full where the sun attains its greatest height, and thin and scanty near the torpid poles, where the quickly-recurring frosts too speedily blight the opening bud, or destroy the ripening fruit.

Nature undergoes a periodic stagnation in the frigid zones, for fluidity is essential to life. Animals and plants, with few exceptions, here remain many months buried in a winter sleep. Over a great portion of the earth, therefore, only those organic forms are capable of full development which have the property of resisting any considerable abstraction of heat. But the nearer we approach the tropics, the greater the increase in variety of structure, grace of form, and mixture of colours, and vigour of organic life. * * * * *

The character of certain portions of the earth's surface appear to affect the nature of the human race, and also its mental culture. Although the dawn of mental culture can not have been determined solely by physical influences, yet climate has, to a great extent, influenced its direction, as well as the character of nations, and the degree of gloom or cheerfulness in the dispositions of men.

How powerfully did the skies of Greece act on its inhabitants! Was it not among the nations who settled in the beautiful and happy region between the Euphrates, the Halys, and the Ægean Sea, that social polish and gentle feelings were first awakened? And was it not from these genial climes that our forefathers, when religious enthusiasm had suddenly opened to them the Holy Lands of the East, brought back to Europe, then relapsing into barbarism, the gentler seeds of civilisation?

The poetical works of the Greeks, and the ruder songs of the primitive northern races, owe much of their peculiar character to the forms of plants and animals, to the mountain-valleys in which their poets dwelt, and to the air which surrounded them.

To revert to more familiar objects, who is it that does not feel himself differently affected beneath the embowering shade of the beechen grove, or on hills crowned with a few scattered pines, or in the flowering meadow where the breeze murmurs through the trembling foliage of the birch? A feeling of melancholy, or solemnity, or of

light, buoyant animation, is in turn awakened by the contemplation of our native trees.

This influence of the physical on the moral world, this mysterious reaction of the sensuous on the ideal, gives to the study of nature, when considered from a higher point of view, a peculiar charm, which has not hitherto been sufficiently recognised.

However much the character of different regions of the earth may depend upon a combination of all these external phenomena, and however much the total impression may be influenced by the outline of mountains and hills, the physiognomy of plants and animals, the azure of the sky, the form of the clouds, and the transparency of the atmosphere, still it cannot be denied that it is the vegetable covering of the earth's surface which chiefly conduces to the effect.

The animal organism is deficient in mass, while the mobility of its individual members, and often their diminutiveness, remove them from the sphere of our observation. Vegetable forms, on the other hand, act on the imagination by their enduring magnitude, for here massive size is indicative of age, and in the vegetable kingdom alone are age and the manifestation of an ever-renewed vigour linked together.—*Views of Nature.*

HINTS ON COMPOSITION.

ALL should learn to write well, not merely to marshal the particles of written language into elegant parade, and write distinctly; but learn to *compose*, and send to the conventions of business and friendship well written contributions of manly thought. That all do *not* know how to write, is evident. As teachers, we every day see literary productions from those who are just passing within the precincts of manhood, that, in point of chirography, look not unlike the bottom of a chopping-dish, or a chaos and war of elementary strokes and dots, and, in point of composition, are nothing but a congress of blunders, in which every line contains an insult to Murray.

Most pupils are averse to the practice of

this art. The "divinity within us" can talk and sing, and draw, without special training; but it seldom stirs itself up to exhibition in this way till education calls it forth. The rules of language seem so much more tyrannical in writing than in speaking, that most (ready enough in conversation) seem disinclined to convey thought in this way. Ideas do not come at the call; they flee away from the channel of utterance as if there were some little inconveniences attending the delivery; so that an attempt to write seems to have the effect to make most pupils cease to think. What a transformation from this state to that of the educated man, who finds his thoughts *crowd for utterance*, as a dense congregation crowds around the doors for egress at the close of service! It was a remark of Sir Walter Scott, that, when he sat down to write, he could employ half a dozen hands as well as one, and of the thoughts that demanded expression he could only seize a few that seemed the most appropriate, and fix them on paper as they flew.

Quite unlike this have been the early attempts even of the most gifted writers. To quote a single instance, Dr. Watts, who, as a sweet psalmist, stands next to the royal singer of Israel, and whose lovely hymns are the standard of excellence in sacred lyrics, made a laughably small beginning; his poetic steed only "limped in rhyme," at first. We believe that it is a matter of history that his Pegasus was "harnessed in metre" on this wise: a small premium had been offered for the best composition; the venerable Doctor showed his deserts and future genius in a couplet like this:—

"With your penny writers I'll not vie;
For your penny premium care not I!"

But, difficult though it be, there must be a first attempt; and it shows the inertness of our nature, that this attempt must be the result of some compulsion on the part of the teacher. We doubt not that many a "mute, inglorious Milton," sleeps in the great multitude of common men, for want of this compulsion prompting to a first attempt.

But the first difficulty overcome, the rest is usually easy; it is nowhere more true than here, that practice makes perfect.

Then, what can we do for our pupils of greater service than early to teach them to express their thoughts on paper? It is a deserved reproach in matters of training, that the scholar carries with him into life so little that is of practical service. Many of our pupils can decline every part of the verb "To Love," and yet have a perfect aversion to writing a common letter; they can tell the length of all the rivers on the globe, it may be, and yet cannot write a promissory note. Which is of the greatest service to the future business man, familiarity with the breadth of the Pacific Ocean, or with an ordinary bill of goods? By the exercise we now speak of, we can render the influence we exert upon the pupil eminently serviceable; for what will more facilitate the labours of the business man hereafter, and commend him to his employers and partners in labour, than a ready knowledge of business forms, and an ability to correspond with ease, and keep an exact and beautiful record of purchases and sales, and the like? What will be more acceptable to friends than frequent epistles, which elegance and taste dictate, as well as love? What will secure the man himself more certainty from loss than the easy habit of penning down a record of each day's losses and gains? What will conduce more to regularity in a scholar and a Christian than a daily journal of errors, and acquisitions, and mental exercises?

Does any teacher ask, What shall our pupils write? We reply, to-day let them write some sentences containing a given word; again, let us give them some fact, and require them to detail it in written language, all their own; let us ask them to give us a description of something they have learned in their daily studies; now a river, now a town, or kingdom. If the scholar is somewhat advanced, such topics as tides, the effect of climate, the different zones, will be excellent. Geography will be rich in topics. And in Grammar especially, which treats of the great theme of language, scarcely a recitation should be allowed to pass without some written exercise; for how sad to make our pupils good grammarians, and yet leave them (as is too often the case) in utter ignorance of what they should most know—how to write and speak well!

Then, again, let the scholar practise awhile with the matter of letter-writing, and send the teacher his good wishes in a letter addressed to Dear Sir, or Sir, or Madam; and write and re-write, till to the folding, sealing, and superscription he can show a good letter, that looks as if it came from a business man's or scholar's desk. At another time, all the business forms, such as notes, orders, receipts, and the like, will form very appropriate matter for exercise. Whatever the pupil tries, let him try till he does it well, even though he should re-write a dozen times. The practice of writing essays upon the various themes presented in study is a good one. For instance, let some one in a class be appointed to-day to read an essay when the class meets to-morrow, on some topic, as the planets, the velocity of light, the power of steam, and the like. All our studies are full of such subjects. If the pupil cannot write a little, it shows that he has as yet learned to small account.

A brief experience will convince any one that an exercise of this kind cannot be otherwise than profitable; far more profitable than indifferent essays upon the common themes of the school-boy's pen. We have walked in the churchyard till we know every epitaph by heart; we have read disquisitions upon patience and virtue, till patience has ceased to be a virtue; we have perused remarks upon temperance, till it seems that nothing more can possibly be said; and now we ask our pupils to leave these topics, for a season, and write upon subjects with which they are or may be familiar. Let them write what they *think*, and they will soon find (what is now new to most of them) that they can think with ease.

THE NERVOUS FLUID,—Although not yet convinced by facts that the nervous fluid is only electricity, Professor Faraday thinks that the agent in the nervous system may be an inorganic force; and if there be reason for supposing that magnetism is a higher relation of force than electricity, so it may well be imagined, that the nervous power may be of a still more exalted character, and yet within the reach of experiment.

EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE SIXTEENTH.

THE CHURCH OF THE HOLY SEPULCHRE, JERUSALEM; CALVARY—ITS RELICS—THE NAVE—THE HOLY SEPULCHRE—VARIOUS ALTARS AND RELICS—CHAPEL OF THE FINDING OF THE CROSSES.—IMPRESSIONS AND REFLECTIONS CAUSED BY THE VISIT TO THE SEPULCHRE—ARGUMENTS AGAINST MONKISH TOPOGRAPHY—VISIT TO THE OUTER PART OF THE CITY—CAVE OF JEREMIAH—BEZETHA—TOMBS OF THE KINGS AND JUDGES—VALLEY OF KEDRON—GARDEN OF GETHSEMANE—MOUNT OF OLIVES—VIEW OF THE CITY FROM THE MOUNT—THE VIA DOLOROSA; ITS SITES AND TRADITIONS.

"In many a heap the ground
Heaves, as though Ruin in a frantic mood
Had done his utmost. Here and there appears,
As left to show his handiwork—not ours,
An idle column, a half-buried arch,
A wall of some great temple.

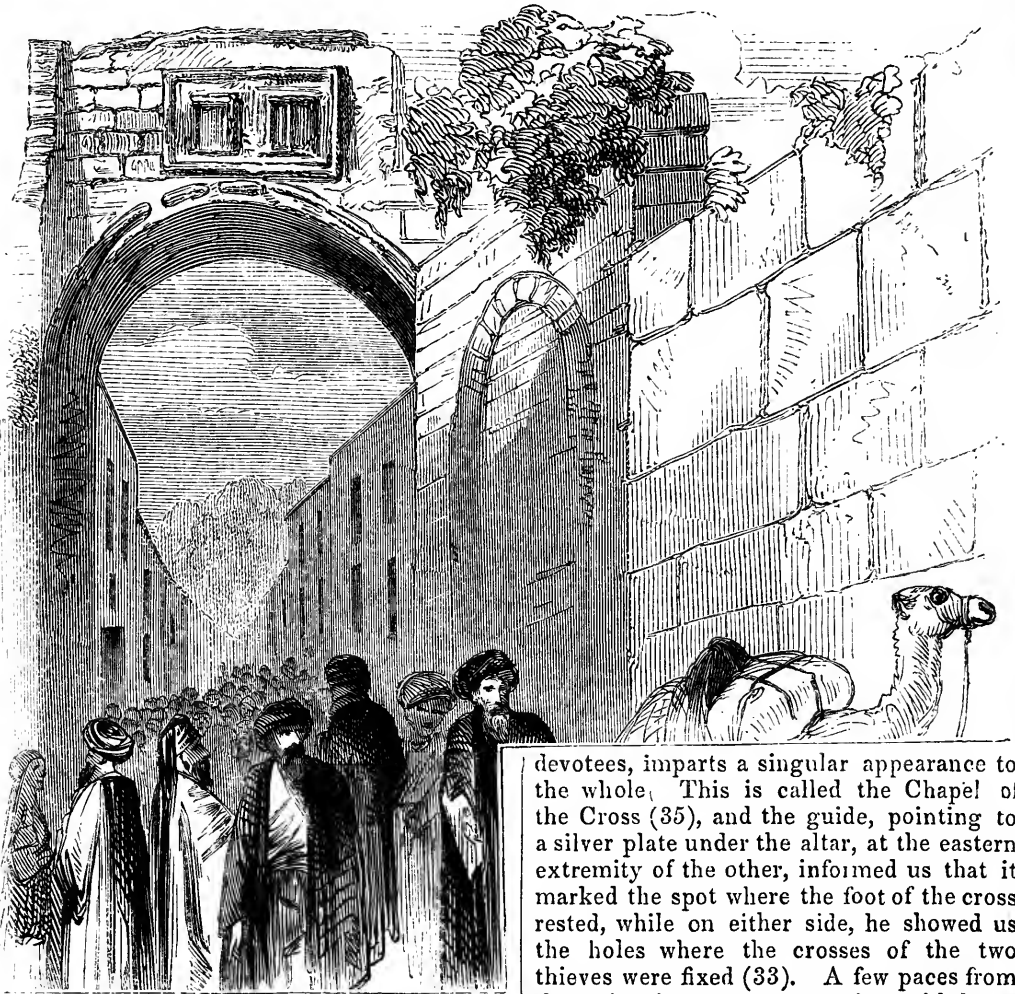
* * * * *
"Along the Sacred Way,
Hither the triumph came, and, winding round
With acclamation, and the martial clang
Of instruments, and cars laden with spoil,
Stopp'd at the sacred stair that then appear'd,
Then through the darkness broke, ample, star-
bright,
As though it led to heaven.

* * * * *
"Now all is changed; and here, as in the wild,
The day is silent, dreary as the night;
None stirring, save the herdsman and his herd,
Savage alike; or they that would explore,
Discuss and learnedly." ROGERS.

LEAVING the devout pilgrims to kiss "the Stone of Unction," we passed through a vast throng of people, in which we recognised Turkish, Arab, and Greek soldiers, mingled with Armenian, Greek, Coptish, and Latin priests. Such a Babel of worshippers and languages, such a variety of costumes and countenances, and such a mixture of expressed passions and feelings, I never remember to have heard or seen collected together in one place, before or since that time.

"Now, Signor! look right to the Calvary, up stairs, where old man pray," shouted our guide, in a loud voice; and therefore following him, we commenced ascending a narrow, dark staircase, (31*) of eight-and-twenty winding steps, nineteen

* See Plan of Holy Sepulchre at p. 140.



of which are of wood, and run up the sides of the church wall, the remainder being formed from the solid rock. Many weary pilgrims pass over these steps during the day, and to

“Calvary’s mournful mountain climb.”

Calvary, or, as it is sometimes called, “Golgotha, that is to say, the place of a skull,”—because, according to tradition, the skull of Adam was deposited there by Melchisedeck,—is about 110 feet south-east of the sepulchre; the upper part of it (κ) is level, and forms a platform, 47 feet square, on which is a chapel divided into two parts, and separated by arches. One is paved with mosaic, hung with tapestry and lighted by lamps whose dim light shed upon the aged or care-worn faces of the

devotees, imparts a singular appearance to the whole. This is called the Chapel of the Cross (35), and the guide, pointing to a silver plate under the altar, at the eastern extremity of the other, informed us that it marked the spot where the foot of the cross rested, while on either side, he showed us the holes where the crosses of the two thieves were fixed (33). A few paces from these, is a long, narrow opening, with brass bars over it. The guide removed the metal covering and passed a lighted taper into the fissure, which is about three feet long and three inches wide; the edges being rough and corresponding, really *appear* to be a rent in the rock (34). This is said to have taken place, when our Saviour, about the ninth hour, being in the agonies of death, cried out with a loud voice from the cross, “Eli, Eli, lama sabacthani?”* The Greeks say that the soul of the bad felon went to perdition through this rent. Adjoining the place where the crosses were placed, is the Chapel of the Crucifixion (32), but as there was not anything remarkable about it, we descended the staircase,

* Matt. xxvii. 46, 51.

and turning to the left, visited the lower part of Calvary (H), and the tombs of Godfrey of Bouillon (36) and his brother Baldwin (37), which are almost destroyed. After this, we proceeded towards the western end of the building, passing "the Stone of Unction" on our way, and pushing through a crowd of noisy Greek and Latin priests in the vestibule (B), entered the nave of the church (C), in the centre of which is the Holy Sepulchre (D). The nave is about 100 feet in diameter, in the form of a circle, surrounded by eight square columns (15) and eight pilasters (16) supporting galleries above, and a lofty cupola. This is the Latin Chapel, in the centre of which is an oblong building of stone, resembling marble, brought from the Red Sea. It is surmounted with a small cupola, pierced with circular windows, and supported by columns. This is the Holy Sepulchre (D) which is the object of the pilgrims' visit to the City of God.

Ascending a few steps, we entered the vestibule or ante-chapel (6), in the centre of which is a small square block of marble, which, we were told, was the stone the angel rolled back from the door and sat upon, when he announced the tidings of the resurrection to Mary Magdalene and the other Mary. "He is not here; for he is risen, as he said. Come, see the place where the Lord lay."* Stooping down, we passed through a narrow door-way, partially veiled from curious eyes by a curtain, and entered the sepulchral chamber (7), which is about seven feet square, containing the sarcophagus or coffin of marble, about six feet long, three feet high, and three feet wide, which forms a kind of altar. Above this a large number of gold and silver lamps, suspended from the roof, are kept constantly burning. They are the gift of princes and nobles, some of whom have made the pilgrimage. The sarcophagus, which is a modern production, is asserted to be the one wherein Joseph and Nicodemus laid the body of our Saviour.†

From the sepulchre, we proceeded to the place where Christ appeared to Mary Magdalene, as "she turned herself back, and saw Jesus standing, and knew not that it was Jesus."‡ Near this is the Chapel of

the Apparition (E), belonging to the Latins, and within the door, on the right, is the Pillar of Flagellation (22), which is almost hidden from view. This is said to be the *identical* pillar to which our Saviour was tied when he was scourged; before being crucified.* The guide fixed a lighted taper to the end of a long stick, and passing it through a hole in the enclosure, showed us the broken shaft of a pillar. Near to the altar of the Flagellation is the altar of the Holy Cross (21), and that of the Holy Sacrament (20), but they are not worthy of special notice.

Retracing our steps from this spot, we turned to the left and entered the Greek Church, which occupies the largest space in the building. It is fitted up in a rich and costly style, and contains the spot where the head of Adam was found, which the Greeks also call the centre of the world (13); the chair of the Greek patriarch of Jerusalem (11); the chair of the Greek vicar (12); and the Sancta Sanctorum (10) with the screen before the altar (9).

Outside of this is the prison (24), where, it is said, our Saviour was confined when he was bound and delivered to Pontius Pilate, the governor;† and the guide showed us one of the miraculously created wonders of the priests—a stone with holes in it, on which our Saviour was placed when put in the stocks! Near to this is the altar of the Inscription over the Cross (25), where the soldier is said to have pierced our Saviour's side with his spear;‡ and, adjoining it, the chapel where the soldiers "took his garments and made four parts, to every soldier a part," and cast lots for his vesture (26).§

Keeping towards the south-west we descended a flight of about thirty steps (27) leading to the Chapel of the Finding of the Crosses (G), which is a dark, damp chamber, about eighteen paces square, dimly lighted by some lamps suspended from a pole. The roof, which is rough and black, is supported by four large columns. In front of us was the altar (28), and, on the right, a seat where the Empress Helena sat and watched the workmen digging below, when they were searching for the crosses. Below this is another chamber (29), darker than

* Matt. xxviii. 2—6. † John xix. 38—42.

‡ John xx. 14.

* Matt. xxvii. 26.

† John xix. 34.

‡ Matt. xxvii. 2.

§ John xix. 23, 24.

the other, which is reached by descending fourteen steps. The guide points to a slab marked with a cross, and says, "Eccolo! there cross found in big hole under him stone." You retreat from this dismal place, retrace your steps to the church, and, turning to the left, arrive at the Chapel of Derision (30), where a large block is shown, as the one on which our Saviour sat whilst mocked by the soldiers, when crowned with thorns and arrayed in a scarlet robe.*

I turned with intense satisfaction from viewing these pretended relics, to gaze upon localities that had at least more of the semblance of reality and probability. Indeed, I should not have trespassed upon the reader's patience thus far, but for a desire to relate things as they exist at the Sepulchre, or, as it was formerly called, the Church of the Resurrection. A visit to the Holy City, that has been "trodden down of the Gentiles," and "ploughed as a field," leaves impressions upon the sober-minded Christian of a mournful kind.

A visit to the Sepulchre is replete with painful associations and feelings. The aged and the young, the noble and the beggar, undergo many a peril and privation, and encounter many hardships to bow down before the supposititious sacred places and relics. The young and beautiful, the fairest daughters of other lands were there, with pale faces and sunken features, that bespoke much mental and bodily pain, days of toil, and weary journeying. Yon man, with a proud and haughty bearing, whose piercing dark eyes wander restlessly o'er the sea of heads, bespeaks a noble origin; but, ever and anon, a saddened look o'erspreads his features, and reveals a tale of hidden woe—perhaps the remembrance of some dark deed committed, that must now be atoned for by rigid penance and vigil. Contrast all the groups of devotees with the jovial-looking monks around; the impassioned fervour and intense devotion of the pilgrims, whose days are numbered, with the jocund laugh of the priest, well lodged and fed. Does not this scene of hope and sorrow, of joy and repentance, of self-denial and triumph, teach us a mighty lesson? Who can gaze on these people who have sacrificed health and

happiness, wealth and luxury, in exchange for poverty and all its horrors, with fell disease, and not be sad? Yet these people who have braved so much, implicitly believe all they see, and all they are told, and go their way, faint and hungry, but buoyed up with the shadow rather than the substance—the illusion and not the reality.

How can we reconcile the discrepancies between traditional and biblical topography? Are we to believe that the Calvary of the present day is the Calvary of Scripture? Assuredly not! We are told in the Bible, that Jesus "suffered *without* the gate;"* "for the place where Jesus was crucified was nigh to the city;"† and there was a garden in it; and in the garden a new "sepulchre, wherein was never man yet laid."‡ In the face of all this, we are shown the spot of the Crucifixion, of the nailing to the cross, and the rent in the rock in a space forty-seven feet square and collected within a comparatively small space, the sepulchre where the body was laid, the place of anointing, the sepulchre of Joseph of Arimathea, and many other places. But we have to remember that the Holy Sepulchre was burned A.D. 614, and the true Cross, with the patriarch Zacharias, carried away; that it was set on fire again, A.D. 969; that about A.D. 1010, the Sepulchre was razed to its foundations, and every exertion made by the Khalif-el-Hâkim to remove all traces of its existence; and that in addition to these, it has been partially destroyed on several occasions. It is but just, then, to conclude that the sites pointed out to pilgrims and travellers, by the monks and guides, do not coincide with historical and biblical accounts, and that the true sites are hidden for some wise purpose.§

We must forbear mentioning the particulars of the enacted representations of the Crucifixion by the Latin church; the riotous scenes that occur on the eve of the Greek Easter-day, when the ceremony of receiving the Holy Fire is performed in the sepulchre, and other exhibitions of the same character.

Passing out of the Church of the Holy

* Hebrews xiii. 12.

† John xix. 20.

‡ John xix. 41.

§ For the arguments respecting the probable identity of the various sites, see Robinson's *Biblical Researches*, vol. ii.

Sepulchre, and through several narrow streets, we came to the Bab-es-Sham, or gate of Damascus—the outer part of which exhibits a fine specimen of massive Saracenic architecture. It was from this spot that the city was taken by Titus, and from hence the road leads to Damascus and the northern part of Palestine.

To the right of the Damascus road and nearly in front of the gate is the Cave

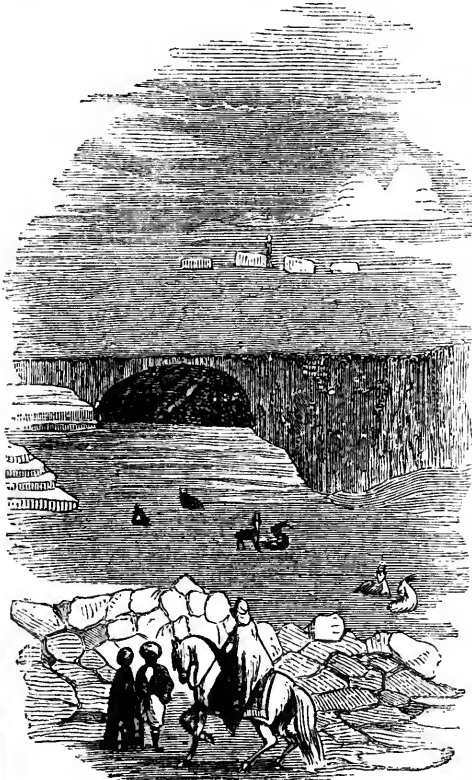
by a few goats that browse on the slope in front of it.

Proceeding a short distance from the cave of the prophet, we came to what was formerly called Bezetha or Cœnopolis, now occupied by olive-trees, but formerly by people of the lower class, and enclosed by Agrippa with a thick wall of great strength.

Not far from this are some fine ancient sepulchres, commonly called the Tombs of the Kings of Israel, but generally considered to be the tomb of the Empress Helena, queen of Adiabene, who was buried near Jerusalem, with her son, Izatus. After clambering over some rubbish, and descending a little, we arrived in a large, open court, cut out of the rock. On the west side it is hollowed out so as to form a wide entrance, which has a band of carved work over it, consisting of large clusters of grapes and garlands of flowers, mingled with other ornaments, all beautifully sculptured, and bearing evidence of Roman skill. The sides of the entrance, which were once ornamented with columns, are now broken and defaced. On the left-hand side of this entrance is a small aperture, through which we crept on our hands and knees, and entered an ante-chamber, about six feet high and ten feet square. We saw several passages leading from this into other chambers, where there are recesses hewn in the rock for the reception of marble sarcophagi, portions of which, with fragments of the pannelled stone doors, that closed the entrance to them, are strewn on the ground. The doors had stone pivots, which turned in sockets cut in the rock.

As the day was closing, we took a hasty glance at the Tombs of the Judges, that are situated a short distance to the north of the sepulchres we had just quitted; but were not repaid for the trouble, as they are far inferior in execution.

Crossing the fields in a south-easterly direction, we came to the head of the valley of Kedron, where some vineyards and olive plantations form the eastern boundary of the deep bed of the brook, which passes in a southerly direction through the vale, between Mount Olivet and the hills on which the Holy City is built, thence through the wilderness of St. Saba, and is finally lost in the Dead Sea. Although the bed of the Kedron bears ample evidence



TOMB OF JEREMIAH.

of the prophet Jeremiah, where he is said to have retired to pour forth his Lamentations, where he sat and looked upon the city, exclaiming, "All that pass by clap their hands at thee; they hiss and wag ther heads at the Daughter of Jerusalem, saying, Is this the city that men call the perfection of beauty, the joy of the whole earth?"* It is a cave wrought in the face of the rock, under a burial-ground, and divided from the road by a low wall of loose stones. Here hermits were wont to live, but the place is now untenanted unless

* Lamentations ii. 15.

of its former greatness, it is now dry, and no longer gladdens the eye of the pilgrim with its silvery stream; for, except during the winter months when the rain has contributed with the snow to form a pool, there is never any water in its bed. There are associations of an historical kind connected with the brook. It is probable that David and all his people crossed the ancient bridge over its bed, which is near to the tomb of Mary, when he fled from Absalom;* it was near to this brook that the idol of Maachah was burnt by her son Asa;† it was in the fields of Kedron that Josiah ordered the priests to burn the vessels that were made for Baal, and to cast the dust of the altars, which the Kings of Judah and Manasseh had made, into the brook;‡ and

"Thou soft-flowing Kedron! by thy limpid stream,
Our Saviour, at night, when the moon's silver beam
Shone bright on thy waters, would oftentimes stray,
And lose, in their murmurs, the toils of the day."

We passed over the bridge with one arch, mentioned above, and entered the garden of "dark Gethsemane," with its eight aged olive trees, enclosed by a stone wall. It was

"Alone to the shade of Gethsemane's garden,
The Saviour repair'd when the supper was o'er;
Weigh'd down with the load of their guilt,
for whose pardon,
Such wonders of sorrow and suffering he bore."

Although this may not be the actual site of the Garden of Gethsemane, still it must be in the vicinity, because we know that it was "over the brook Cedron,"§ and "near to the city." The guide pointed to a part of the garden, which, he informed us, is looked upon as accursed; being the place where the traitor Judas walked, when he came with "a great multitude, with swords and staves," and betrayed his Divine Master with a kiss.|| The south-eastern corner of the garden—a ledge of rocks—is assigned as the spot where Peter, James, and John slept.¶

Commencing the ascent of the Mount of Olives, we were shown the Grotto of the Agony, which the monks assert is the one

where our Saviour retired, and "kneeling down" prayed—

"Oh, Father! behold in compassion thy Son,—
Now let this cup pass," then, as plaintive,
he sighed,
Exclaimed, 'Not my will, but thine, Father's,
be done;'"

and his sweat was, "as it were, great drops of blood falling down to the ground."* A little further on, the guide pointed to a spot where our Saviour is said to have taught the Apostles the Universal Prayer, and near to this is the cave where the Creed was composed!

The Mount of Olives forms part of a range of limestone mountains extending to the north and south-west. It has three unequal summits; the highest of them, rising from the garden of Gethsemane, is crowned by the Church of the Ascension, within which is shown a stone having a mark something like the impression of a foot. This is affirmed to be the print of our Saviour's foot, left upon the stone at the moment of his ascension; the mark of the other foot is said to have been removed by the Saracens, and placed in the Mosque of Omar. Helena, the mother of Constantine, founded a monastery on the spot, which was afterwards converted into a mosque; and the Turks now exact a tribute from all pilgrims who may desire to have an impression of the foot-print on the stone.

A little to the north of the church is a spot, pointed out as the one where the Apostles retired after the ascension of our Saviour, "and while they looked steadfastly toward heaven," they were accosted by two angels, "Ye men of Galilee, why stand ye gazing up into heaven?"†

The view from this part is very fine, and decidedly the most extensive. At our feet is the Garden of Gethsemane, and the Tomb of the Virgin near to it; the Valley of Kedron and the Vale of Jehoshaphat, with the tombs of Absalom, Jehoshaphat, and Zacharias. To the south is the village of Siloam, the Mount of Offence, and the Pool of Siloam. Before us is a cluster of flat-roofed buildings, mingled with domes and lofty minarets, and relieved by long lines of streets, and ruined walls, cypresses, and olive trees, rugged cliffs and sterile banks; while in the midst we can see the Church of the Holy Sepulchre, the bazaars,

* 2 Sam. xv. 23. † 1 Kings xv. 13.

† 2 Kings xxiii. 12. § John xviii. 1.

|| Matt. xxvi. 47—49. ¶ Luke xxii. 46.5

* Luke xxii. 42—44. † Acts i. 11.

the Via Dolorosa winding from St. Stephen's Gate, and in front, Mount Moriah, crowned with the Mosque of Omar, flashing its gilded crescents and spires in the last rays of the declining sun. Far away to the south, the eye wanders o'er the barren hills of Judah, the Jordan, the still waters of the Dead Sea, and the distant mountains of Moab, and below us on our left is a fine olive tree, with gnarled trunk and branches, that stands near the road to Jericho, along which the Bedouin is leading his camel; while, afar off, a husbandman is gathering the flocks that have endeavoured to obtain a meal from the scorched herbage during the day.*

Although we saw many other spots from the Mount, including the Hill of Evil Council, Mount Zion, and the Valley of the Son of Hinnom, the day was too far advanced to remain there any longer; therefore we descended, and retracing our steps passed through St. Stephen's Gate, so called from its vicinity to the spot where Stephen was stoned,† and entered the Via Dolorosa, the road along which our Lord passed to Calvary, which contains many traditional sites connected with that event.

Proceeding along this street, which runs from east to west, we were first pointed out the residence of the Turkish governor, and then the arch of the *Ecce Homo!* over which is a double window, where Pilate is said to have brought our Saviour forth to the people, saying, "Behold the Man!"‡ At this time of the year, and day, the street was thronged with pilgrims and Jews, and bore an unusual appearance of bustle, for camels with noiseless tread were bearing bales of merchandise along, while the hum of voices was louder than usual. A few yards beyond this are the remains of a church, built on the spot where the mother of our Saviour met him. Sixty paces further on, Simon the Cyrenean met the multitude, and was compelled to bear the cross when our Saviour fell down under the weight of it.§ The guide gravely pointed to an impression in the wall which he said was made by the end of the cross! Near to this is the spot where our Saviour turned to the women that were following him, and said, "Daughters of Jerusalem,

weep not for me."* After this we were pointed out in the following order, the Dwelling of Lazarus; the House of the Rich Man; the House of Veronica, the pious woman; and the Gate of Judgment, through which our Saviour passed as he went to Calvary.

But we have lingered almost too long amid these traditional sites, for

"The sun is set—and yet his light
Is lingering in the crimson sky,
Like memory beautiful and bright,
Of holy men that die.

"The dews fall gently on the flower,
Their fresh'ning influence to impart;
As pity's tears, of soothing power,
Revive the drooping heart."



THE POET AND THE ROSE.

A FABLE.

NEAR Flora's bower, at even's hour,
On zephyrs light and free,
A Poet's song was borne along
With nature's majesty!

* * * * *

The Poet's breath soon ceased in death,
The Rose soon droop'd and died;
And in the grave, proud Lethe's wave
Soon laid them side by side.

"Oh, Poet," said the dying Rose,
"Where now thy boasted powers?
Where now the deep impassion'd thoughts
That graced thy sunny hours?"

"The fading rose thou once did deem
The offspring of a day,
Doom'd but to shed its sweet perfume,
And pass from earth away.

"What more than I hast thou to boast?
Thou, too, must with me die;
And when thy friends thy loss shall mourn,
The winds for me will sigh."

"Fair Rose," the Poet gently sung,
"Our course is almost run;
Yet what to you is endless death,
To me is life begun!

"You shed, 'tis true, a sweet perfume,
But 'tis the Poet's song
That catches up thy fragrance sweet,
And all thy charms prolong.

"It is the Poet's gifted pen
That carves thy dying name;
And from the sweets by thee exhaled,
He rears thy lasting fame.

"Thus, though together we must sleep,
Each 'neath the same green sod,
The one returns again to dust,
The other to his God!"

GEO. H. BANISTER.

* See Engraving, p. 138. † Acts vii. 58.

‡ John xix. 5. § Luke xxiii. 26.

* Luke xxiii. 28.

THE BIRD TALISMAN.
AN EASTERN TALE.
FOR THE TUTOR'S YOUNGER PUPILS.

(Concluded from page 212.)

LONG and weary was the day, but night came at last. The princess did not, however, venture from her hiding-place till past the middle of the night, when she thought she should be less likely to meet anybody on her way to the *cadi's* house. She then came down from the tree, and unbolting the garden door, she went into the lane, and returning by the way that she had come in the morning, she soon found herself in the open ground surrounding the ruined

mosque. She made her way, as well as she could guess in the darkness, towards the *cadi's* garden, hoping to find some means of climbing over the wall, and so getting in without being observed by any of the slaves; but just as she was passing the ruined mosque, she saw her friends, the owls, come flying over her head in the faint starlight. She called out to them, and asked whether they had seen anything of the parrot or the two daws. "Yes," said the owl, perching on a wall, "they are all three roosting here in the ruin, and have been flying about all day looking for you." "Oh, bring me to them!" said the princess; and the owl, flying into the ruin, soon reappeared with the parrot fluttering after him. The parrot flew into



the princess's bosom with an hysterical scream, and said, "Oh, my dear child, have I found you at last? I feared some terrible misfortune had happened to you." The princess then told her how she had escaped, and that she was now going to try to get into the *cadi's* garden, but the parrot interrupted her, and told her of poor Zuleika's being seized for a slave instead of her. She was overwhelmed with grief at hearing this, and declared that she would go and give herself up to save Zuleika; and in spite of all the parrot could say, she instantly set out to fulfil her determination, for she could not bear to think that she had brought such a calamity on Zuleika and her mother. "Well, my dear child," said the parrot, "if you are bent on destroying yourself, at least, I will go with you; but first I will

tell the daws to remain about this ruin, that, in case of need, we may know where to find them." Having done this, the parrot nestled under the princess's cloak, and she left the ruin, and going into the nearest street, went straight to the door of the *cadi's* house and knocked loudly. After some time, an old slave put his head out of the window, and asked who was there. "It is I, Shereen," said the princess, "let me in." The old slave opened the door, and by the princess's desire, took her to the women's apartment. She was admitted by Zuleika's nurse, who, as soon as she saw her, began to lament Zuleika's misfortune, and to tell her what had happened; but the princess stopped her, and said, "I know it all, but she shall not suffer for me: I am come to give myself up." She then desired the nurse to take her to Zuleika's mother;

and this was done, when the princess, throwing herself into the arms of the cadî's wife, told her she was come to give herself up, and to save her friend. The cadî's wife kissed her, and wept over her, but did not oppose her design, for she knew it was the only way by which her daughter could be restored to her. But now the poor princess, not having eaten all day, and being quite exhausted with all she had undergone, fell in a swoon on the floor. The cadî's wife had her put to bed, and as soon as she came to herself, she begged for a little food, which was given to her; and she then fell asleep and did not awaken till broad daylight. As soon as she had breakfasted, the cadî's wife took her to her husband, who was informed of her noble behaviour, which he praised very highly; and after taking a mournful and pathetic leave of the cadî's wife, he led her away by the hand, and took her to the slave-prison. They were immediately taken to the keeper, to whom the cadî was relating the object of his visit, when they were interrupted by the arrival of the vizier, who had come to inspect the slaves. The keeper referred the cadî to the vizier, who, when he had heard what he had to say—being no friend of his—declared that it was impossible to let Zuleika go, for there was so much difficulty in raising the ransom for the city, that the king had given him orders to seize and make slaves of any one he could lay his hands on, so that both Zuleika and Shereem must be kept. It was in vain that the cadî intreated, and threatened, and tore his beard with rage and grief. He went straight to the palace, and complained to the king that his daughter had been seized as a slave; but the king said there was no help for it, the money must be raised, and that he would sell the cadî himself if any person would buy him.

The only comfort the two little girls had in their misfortune, was that they were confined together in the same cell. It was a very small one, with a little window in it just large enough for the parrot to go through. Through this window the parrot went to learn the news in the city, and to carry a note from Zuleika to her mother. When she came back, she told the princess that the cadî could not raise money enough to redeem Zuleika, and that in a day or two all the slaves would be taken to the

Cashmerian camp, and that the enemy's army would then immediately march back to Cashmere, with all their spoil; so that there was the greatest danger of the princess falling again into the hands of her greatest enemy. "There is but one hope," said the parrot: "Give me your ring, and I will send the daws with it to your grandfather; they will tell him all that has happened, and he is so wise that he will know how to help us if any help is possible; but he can do nothing for us without the ring, for that gives command over all the birds of the air, and it was with this ring that the famous enchanter, Moozuffer, ruled over the birds, and by their help worked so many wonders." The princess gave the ring to the parrot, and she immediately flew with it to the ruin, and calling the daws, ordered one of them to fly with all speed to the hermitage at the source of the Ganges, and to give the hermit the ring, and tell him all that had happened. She told the other daw to keep in the neighbourhood of the camp, and to fly after the army whenever it marched. Having given these instructions to the daws, she returned to the slave-prison.

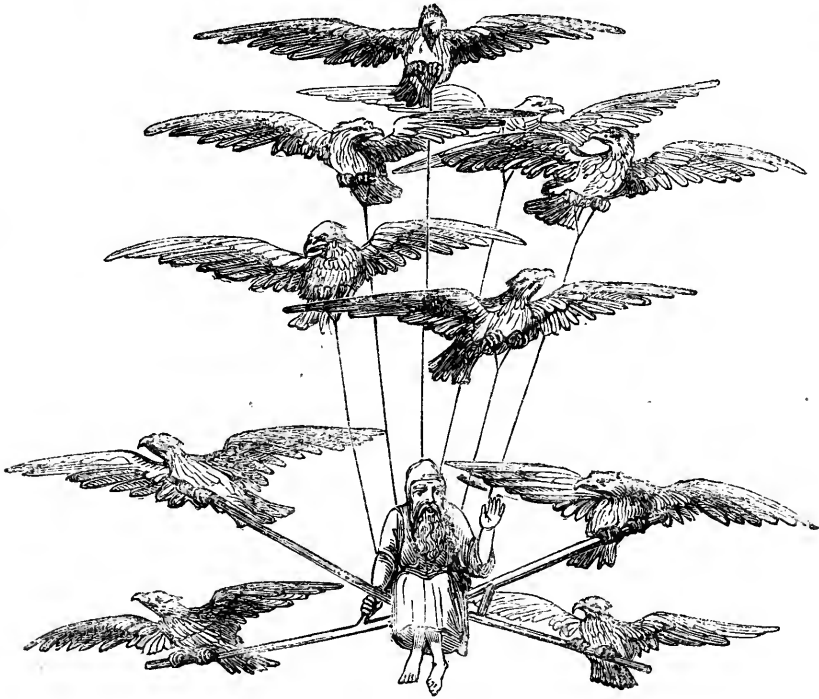
Next morning the slaves were taken to the camp, and delivered to the Cashmerian general, and the army immediately marched on its return to Cashmere. The two little girls were carried together in a close litter, and the parrot with them, but for want of the ring the poor bird and her mistress were no longer able to converse together, which was a great grief to them.

In this way they travelled many days, till at length they arrived within a day's journey of Cashmere. Here the army halted in a great plain, and the queen came from the city, with all her court, to receive her victorious army, and to see the spoils of war they had brought with them. The army was all drawn up in grand array, and the treasures, the gold, silver, and jewels, rich silks and shawls, beautiful horses, and the slaves which had been brought from Lahore, were placed in front of the general's tent, where they formed a splendid spectacle. The queen sat in her howdah on an elephant most gorgeously caparisoned, and rode in front of the long lines of soldiers, attended by the general and all her court. When she came opposite the place where the slaves

were drawn up, her eye fell upon the princess, and she started and turned pale. Baboof sat behind her in the howdah, and turning to him, she whispered something, and pointed out the princess to him. At first he seemed struck with astonishment, but in a few moments he descended from the howdah, and going to the general, said there was one amongst the female slaves to whom the queen had taken a great fancy, and whom she would take to

wait on herself, the rest of the spoil should be sold to defray the expenses of the war. Baboof then went straight to where the princess stood trembling, (for she saw at once that the queen had recognised her), and taking her by the arm, ordered his followers to take charge of her, when a wonderful sight was seen.

High up in the air appeared a flock of mountain eagles, flying all close together, and in the midst of them was a large, dark

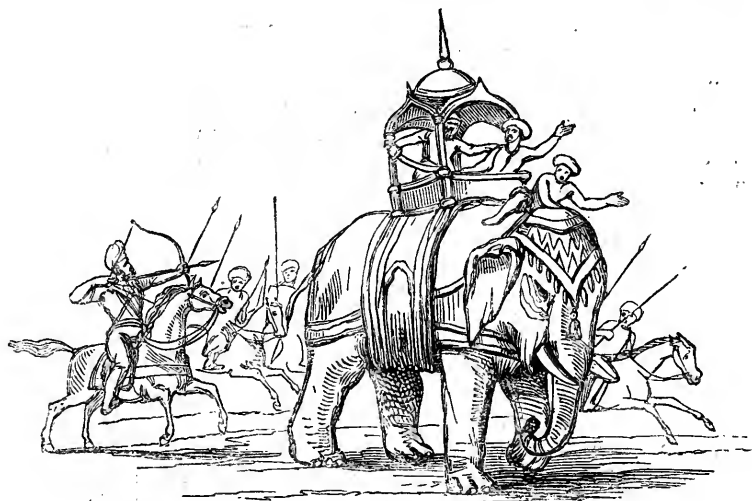


object. They came rapidly over the plain; and, sweeping over the heads of the multitude, a man was seen, suspended in a sort of chair by means of long, slender poles, and cords, which the eagles held in their claws, and seemed to obey the voice of the old man—who wore a hermit's dress—and to follow all his directions. Hovering over the spot where the queen, the general, and all the court were looking up, in speechless astonishment, the old hermit called out, in a loud voice:—"General! faithful servant! Murad! look up, and behold your ancient master! I know, that when others were faithless, and I was driven from my kingdom, you were faithful still, and that it was to your absence alone that my defeat was

owing; nor did you take service under the usurper till after my retirement. I call upon you, now, to obey your old master, and to help him against the vile woman who disgraces the throne." At first, the general thought it was a vision; but presently recognising the voice and features of the old king, he drew his sword, and cried out, with a loud voice:—"Soldiers, our old king comes back to us from heaven; let those who are for me and for the king, hold up their hands!" The soldiers raised a tremendous shout of "Long live the king!" and brandished their weapons over their heads. Baboof quitted the princess; and hastily climbing up to his place on the royal elephant, ordered the driver to hasten

with all speed to the city. The driver obeyed, and the queen and Baboof would have escaped; but the general ordered some of his cavalry to pursue the elephant. They soon came up with him; and the archers, aiming at the driver, ordered him to stop, on pain of being shot. He saw that he could not escape, and stopped the elephant; when Baboof, thinking to save his own life by turning against the queen, drew his scimitar, as he sat behind her, and cutting off her head, held it up in the sight

of all the people, crying, "Long live the king!" The cavalry brought the elephant with the dead queen and Baboof back to the general, whom they found with the principal officers doing homage to the old king, who had come down from his wonderful flying seat, and was standing on the ground. Baboof now descended from the elephant, and laid the queen's head at the feet of the old king; but, instead of the thanks he hoped for, the king said—"Wretch! think not, by one crime, to blot



out the memory of another." Then, turning to the soldiers, at a sign from his hand, one of them struck off the head of Baboof.

The king then turning to the crowd of slaves, cried out, "Where is my dear grandchild," and the next moment the princess threw herself at his feet. He took her into his arms, and kissed her; and was going to take her with him on one of the elephants, when she begged him to let Zuleika come with them. This was granted; and the old king, with the princess, and Zuleika, proceeded at the head of the army to take possession of his ancient capital. You may be sure that the parrot was not left behind, but sat proudly on the princess's arm, bowing graciously to the shouting people in the streets; while the two daws flew joyously overhead, to resume their old roosting-place in the palace garden; and the flock of eagles, released from their service, flew back to their home in the mountains.

The first thing the princess did after her arrival at the palace, was to beg her grandfather to send to Lahore, for Zuleika's father and mother, who came with joy to rejoin their daughter, and had a house given them close to the royal palace, so that the two little girls saw each other every day, and passed most of their time together. Neither did the princess forget her old friend, the fisherman, who, at her request, was appointed by the old king captain of the royal pleasure-boats.

SOME people are ever laying plans, but never moisten a hair for their execution. Labour makes the hero, not the dreaming how it may be done. Get a plan, and maintain it, in cloudy, stormy, or sunshiny weather, but remember that it will not avail you if you do not labour for its fulfilment. Toil is prayer; and, when earnest in application, cannot fail of being answered.

THE CHOICE OF A PURSUIT FOR LIFE.

(Concluded from page 208.)

It is a mistaken idea to suppose that the professions are the only roads to eminence. Sure and certain roads they undoubtedly are, to those who possess great intellectual powers; and who have entered them from those motives, which, as I have endeavoured to show, should influence a man in the selection of any pursuit. But men may attain eminence, and perhaps be more deserving of it in various other occupations; and he who would be out of place in the professional ranks, might, for instance, if he would but observe the complexion of his own mind, discover in the natural charms of agricultural pursuits a suitable sphere for his exertions; might gratify his ambition in the wide and extended field they offer for scientific investigation; and deserve the thanks of the community by doing something likely to be of real and permanent utility, either by making new and important discoveries, or increasing and enlarging the applicability of old ones. And even he, who has caused two blades of grass to grow where but one grew before, is undoubtedly worthy of all commendation. Many, again, who would scarcely succeed at other avocations, may reap golden honours in the busy exchange and crowded mart, and possess larger means of doing good than professional men can generally hope to attain.

The mechanic arts afford a wide scope for inventive genius; and it generally may be discovered, at an early period of life, whether or not we should direct our attention to them. Fondness for creating and improving, and capacity for producing the new and useful, develop themselves at an early age, and are prognostics and indications which should be of great weight in determining their possessor in his selection of an occupation. And whether he be animated by the desire of winning an imperishable name, or, by that which is higher and nobler—the desire of discharging his duty in that path which Providence has assigned to him, let him by no means disregard them, or prove recreant to them. For, it may have been reserved for him to add new treasures to

the repositories of science; to astonish the world, it may be, by something more useful than the steam engine; or more wonderful than the magnetic telegraph.

The same remarks may be applied to other pursuits; to Poetry, to Painting, and to Music, which demand a “capacity for seeing” and selecting the beautiful. Genius for these pursuits generally manifests itself early in life; at first, scarcely perceptible, like the early dawns of the morning sun; but let not the moral horizon be shrouded by the distracting clouds of evil passions, and it shall go on increasing in splendour and brilliancy, diffusing its genial warmth and fertilizing influence, until it attain the full radiance of the noon-day sun.

The object which actuates most men is the desire of gain. For this they toil and slave; for this, the sacrifice of comfort, the neglect of social and domestic duties; for this, the premature wrinkles of the brow, and how often an early grave! How many are disappointed in the golden race; the day dreams of their ambition are never to be realized. A tempest, a fire, or some dispensation of Providence, has disappointed their fondest hopes. For them the sun in heaven has gone down. All that, for which they considered life worth having, and to which they made every thing else subservient, has vanished from their eyes. The vanity of their desires has been mocked. The object of their idolatry, to whom they sacrificed, it may be, honour, integrity, and virtue, has been dashed from the altar; the temple has been overthrown, and the profane worshippers buried in its ruins. There are indeed men, who can again renew their pagan rites, whose devotion no misfortunes can entirely subdue. But, apart from the uncertainty of riches, and the manifest folly of placing our whole happiness upon that which is necessarily unsubstantial, and which is so often delusive,—what is there in the life or example of a man, whose ideas never expand beyond the contracted circle of self-aggrandizement, who has *no other object* than the mere accumulation of money? What is there in his life or example, though his exertions be crowned with complete success; though he accumulate money, I was about to say to his heart's content; but with him it is as if

“Increase of appetite had grown
By what it fed on.”

What is there worthy of admiration? A man cannot, indeed, be blamed, who discharges his duties faithfully to others; and is, at the same time engaged in the honest endeavour to improve his condition in life. And I hope that no one will understand me as condemning mercantile pursuits, or the desire of accumulating large fortunes.

All that I am contending for is, that we should find something else in this world worth living for. All that I mean to inculcate is, that a man's heart should not become so much engrossed in the pursuit of wealth, that he can discover nothing else, in this beautiful world, to admire; nothing to compassionate, nothing to sympathise with; in short, nothing to be natural with. Commerce, trade, business—let our fellow-citizens follow for their pleasure or profit. Let our merchants accumulate princely fortunes; let them build up, as they have done, our great cities, and increase the wealth, the resources, and the power of our country; let the white wings of commerce spread over every sea; but let not men, in the pursuit of gain, forget that *they are men*; let them not become mere machines. How often are men led away, by the desire of sudden riches, from the paths of duty, of honour, of virtue, into all the intricacies of chicanery, of fraud, and of crime! How many, yielding to this pervading desire, have meanly and basely been led to take some undue advantage of others, to make use of money entrusted to their keeping; to embark, with these moneys, (sometimes the property of widows and orphans,) in hazardous and visionary speculations! Not that, in the first instance, they intended to commit crime; they would have shrunk from the imputation as sensitively as the purest among us; but men are led on by imperceptible degrees, until their minds are so absorbed with the desire of speedy riches, that they become dissatisfied with the slow returns of a legitimate business: impatient, perhaps, of an inferior position, envious of the splendour and wealth of others, they are led, almost unconsciously, into the commission of positive crime, and are scarcely themselves able to recognise the "rascals," which the world calls them, when their deeds are all laid bare to the cold gaze of an uncharitable public. And where shall we find language sufficiently forcible to condemn

those slaves of Plutus, who "delve in Mammon's dirty mire," for the sake of accumulating what they never use! How are such men required for the wealth which they leave behind them! How quickly is it dissipated by impatient heirs, who never troubled themselves about them, except to calculate the probable duration of their lives! And this is the gratitude for all the pains and anxieties of amassing wealth. And when they leave their wealth to public institutions, or to public charities, how does the public requite them? Sometimes, indeed, by marble statues, as cold as the hearts of those who erect them, and as the lifeless dust they are intended to commemorate. Is their bier ever hallowed by one genuine tear of human sympathy? Who thanks them? Who cherishes their memory? And yet, they are often public benefactors! but, benefactors by necessity, benefactors by compulsion, benefactors for the purpose of carrying out, as far as possible, that one idea, from which, living and dying, they never swerved—the perpetuation of their own estates. And they generally occupy that position in the opinion of mankind which they deserve. Infidel to Christianity, infidel to its divine precepts, infidel to every domestic and social tie, and to the natural feelings of the heart, they die as they lived, unloved, without friends, without sympathy, the embodiment of an idea, and hold no place in the affection, in the respect, or in the esteem of mankind, except that which is always connected with, and never divests itself of, the idea of wealth, and without which it is unappreciable. If they had died without wealth, if they had been gathered to the tomb without the means of erecting marble temples to their own memory, what act of theirs would preserve them from the night of oblivion, in which the majority of mankind are obscured?

And there are many *smaller* men who are equally open to censure, but who do not combine with their avarice those enlightened commercial views, and that comprehensive grasp of business details, which render the character at once detestable and sublime—some such men we all know, who live in the constant pursuit of gain, and who desire nothing beyond, and nothing but gain. Such men have no fine traits of character; if they do nothing which is positively bad,

they confer no benefits upon society, except those which the community always receives, and which are necessarily incident to the pursuit of any legitimate occupation. Have men of this description a proper object in view in pursuing their business? To such a question what is the response of every generous mind—of every man who has got rid of what some would call sickly sensibilities—whose finer traits of character have been somewhat effaced by contact with the world—for, alas! to a certain extent that must be, but who has still enough of those feelings, “which partake less of earth than heaven,” to do what in him lies, and when the occasion occurs for the amelioration of mankind, who believes in friendship though he is apt to be somewhat suspicious, and who can still drop a tear of genuine sympathy over real misfortune—what would be his answer? I need not say what would be yours, or interpret the emotions of your hearts, to which language is but a weak exponent.

What has such a man, when prostrated upon the bed of death, to console him in a review of his past life? What is there, but one long unbroken series of selfish deeds? What generous action, what noble sympathy, what benefits conferred, what actions for the amelioration of individual man, or of mankind, hover in the shape of good angels around his couch, shedding upon his dying hour the grateful memory of the past, whispering hope for the future, and—to borrow from a beautiful German allegory—ready to accompany him in his last journey, beyond the prison of the grave, and to plead eloquently before the very throne of God, obtaining mercy and grace?

How then is it with him? Is his dying hour disturbed by the recollection of golden opportunities of doing good neglected? Do the prayers of the orphan and the widow whom he has neglected now ring in his ear? Do those to whom he has meted out merely the legal requirements of human justice—who is represented blind, and with no eye of mercy—range themselves in spectral solemnity about him, as the shadows of death and the night of the grave gather around? Do they point to the writing on the wall, and can he interpret it? Or do all the misdeeds of an ill-spent life come in the shape of demons to torment his dying hour, and give him timely warn-

ing to prepare? Alas, for him—he is not so fortunate! In these dread moments, the one absorbing idea of his life gives place to nothing else, and the gold jingles in his hand as the last breath of life rattles from his throat; and what he often carries with him to a dread eternity is neither hope of heaven nor fear of hell, but love for that of which he has made no good use in this world, and which cannot buy his salvation in the next. Oh, then, beware of too much covetousness, which the great Apostle of the Gentiles has called the root of all evil, and placed by the side of all unrighteousness! It is said to be the vice of old age; but, like everything else, the seeds are planted in the spring time, and yield their baneful crop at a more advanced period. Of what evils is it not the source! how many ties has it severed! Human nature may well weep at the spectacle of children almost quarrelling over the bier of their father for the possession of his property; the worm of covetousness has gnawed and gangrened their hearts, before the worm of the earth has made his hated repast. Covetousness is, indeed, the “root of all evil.” It has made war, and concluded peace; it has polluted the sanctuary, and taken the offering from the altar; it has entered the temple of Justice, and “bartered the majestic wrinkles of her brow;” it made a suicide of Judas, and of many others.

There is another error into which men fall, and that is, in making the acquisition of fame the sole object of their exertions; the error, indeed, of noble natures, and, unfortunately, it often commands our respect when it really deserves reprobation.

They are willing to be good, indeed, if goodness will confer greatness; but the struggle is for *greatness*. Policy, not principle; expediency, not justice, is made the object of every act. Such men estimate the value of a measure, not by its excellence, nor by the benefit it will confer upon the community, but by the amount of popular applause with which it is likely to be followed. They seldom or never derive happiness from the conscientious discharge of regular duties. Everything is referred to results. They consider themselves fortunate, perhaps, when the path of fame is also that of duty; but still the question is always, how far each act will advance their interests, or swell the measure

of their fame. The danger is, that men, unless controlled by strong principles of justice, will sacrifice everything human and divine at the shrine of their ambition.

Wealth is uncertain, and often eludes our pursuit. Fame is not always desirable, and is, at best, but a transient flame, kept alive by the fickle breath of popular applause. These should not be alone the leading objects of our lives; they are too unsubstantial in their character to afford permanent happiness, and the cup is too often dashed, untasted, from the lips. But surely there are other objects which we should propose to ourselves—objects, higher, nobler, greater by far than the acquisition of wealth or fame, but not incompatible with either—and these objects may be all embraced in one comprehensive word, *Duty*.

There is, however, an ambition which is worthy of cultivation. It is not the ambition of conquest, or the desire to captivate the minds of men; it is an ambition which purifies while it elevates, and which can make men heroes without making them slaves; an ambition which is ever guided by the light of reason, of humanity, and of true religion, and which has in it nothing of folly, of fanaticism, or of modern philosophy; it is, simply, the ambition to discharge our duty, in whatever condition of life we may be placed. And what may he not accomplish who makes duty his leader, and, like a good soldier, is ever ready to obey her commands? His deeds, judged merely by their effects, dwindle into insignificance, when compared with those of the great statesman, or the great conqueror; but if we could lay bare his heart, how should we yield our unfeigned admiration—how much richer in deeds of real honour and of true bravery! Search not always the biographies of great men, or the records of great events for examples. It is in the walks of every-day life that you will find men who obey the voice of duty at all hazards and at all risks—at the sacrifice of comfort, of friends, of health, and of life itself. Their character is eminently self-sacrificing; their heroism the most exalted: their victories, victories over self and the passions of human nature; their triumphs solitary and unattended by the voices of applauding thousands; their reward an approving conscience. But there are examples of men, who have

been actuated by this ambition, who have achieved as much, and bequeathed to posterity as bright a name—aye, and how much better and purer than any who have toiled for the mere love of fame.

Of these we have already commenced giving examples in our "Biographical Sketches," beginning with the "Life of John Hunter." Our "Guide to the Professions" is designed to assist in the selection of a pursuit in life and the preparation required; while the eminent characters we shall cite are intended to excite a laudable ambition, and to encourage perseverance and zeal in the pursuit adopted.

The path of duty is not always an easy one: it has its rugged cliffs and steep ascents: but when you have arrived at the journey's end, the setting sun of life will shed a parting tinge over the whole road which you have travelled, and exhibit it clearly to your view: and if it illuminate a path from which you have never deviated, your satisfaction will be great in proportion to the magnitude of its difficulties.



WONDERFUL CHILDREN.

BY LADY MORGAN.

"So wise, so young, they say do ne'er live long."
RICHARD III.

It is a curious fact that, in the present times, we have none of those precocious prodigies so numerous in the olden time. It seems to have been one of the peculiar privileges of the wisdom of our ancestors to produce those infant miracles of learning and science, the "Admirable Crichtons" of the nursery, who studied in cradles and lectured from go-carts. "I was not," says the quaint, but most amusing Mr. Evelyn, "initiated into any rudiments *till* I was *four* yeas old; and then one Friar taught us at the church door of Wotton!" This—"till I was *four* years old"—marks his conviction of his own backwardness, in comparing himself with other children of his age and times; but it was more particularly in reference to the superior wit, talent, and learning of his own son, at that early period of his brief existence, who was, to use his afflicted father's words, a "prodigy for wit and understanding." A prodigy, indeed! for, "at two years and a half old,

he could perfectly read any of the English, French, Latin, and Gothic characters, pronouncing the three first languages exactly," &c. &c.

The termination of this most short, splendid, and unnatural career, is worth marking: "He died," says Evelyn, "at five years, after six fits of quartan ague, with which it pleased God to visit him; though, in my opinion, he was suffocated by the women and maids who tended him, and covered him too hot with blankets, as he lay in a cradle, near an *excessive hot fire* (in a quartan fever). I suffered him to be opened, when they found he was what is vulgarly called, *livergrown*!" What a picture! what a history of the times, the state of science, and the wisdom of our ancestors! In the first instance, the attributing an infliction to the Divine visitation, which was, at the same time, assignable to vulgar nursery maids and hot blankets. In the next, the vain father not perceiving that the genius of his child was but disease, and his supernatural intelligence only the unnatural development of faculties, most probably produced by mal-organization, which the style of his rearing and education was so calculated to confirm. "Before his fifth year, he had not only skill to read most written hands, but to decline all nouns, conjugate the verbs regular and irregular, learned out "*Puerlis*," got by heart almost the entire vocabulary of Latin and French primitives, had mastered syntax, could turn English into Latin, construe and prove what he had read, knew the government and use of relatives, verbs, substantives, ellipses, and many figures and tropes, and made a considerable progress in Comonius's *Janua*, and had a strong passion for Greek."

This is too frightful—it makes one shudder to transcribe it. Such, however, was the education by which an accomplished and really eminent parent—experienced for the age in which he lived—hesitated not to hurry his wonderful child to an untimely grave.

Yet these were, doubtless, the times when learning was dearly prized and knowledge little diffused; when monastic universities, founded by the church, through the influence of its royal and noble dependents, were the sole depositories of the little that was known worth the labour of acquiring: and when the most learned of the com-

munity had less solid practical information than the operative mechanics of the present day. Such were the times when plague, pestilence, and famine were events of ordinary occurrence; when corruption in morals and baseness in politics flourished, even to the extent of surrounding a king, at the altar of his God, with the ministers of his vices, and converting the "brightest" and the "wisest" into the worst and meanest of mankind. These were the times of the most brutal ignorance in the people, and the greatest profligacy in the nobility; and these were the times that produced such learned little prodigies as young Evelyn, under a system of education calculated to make such prodigies; but not to form citizens for a free state, nor legislators for a great nation.

Whatever may have been the natural abilities of this poor child, to have made such a progress in the learned languages at five years old, he must have been the object and victim of a very laborious system of study, all applied to the exercise of his memory. He must therefore have submitted to close confinement in warm rooms, to the privation of air and exercise, and to a sedentary and cramped position; and he was probably much injured by the gross habit of eating and the want of personal purity, so remarkable in an age when meat was devoured three or four times a day, even by the most dainty; and when general ablutions were resorted to more as a remedy than a daily habit.

The overworking of the brain at the expense of all the other functions, must also have had a fatal effect even on children of robust temperaments; and the Indian practice of flinging their offspring into the sea to sink or swim, as strength or feebleness decided, was humanity and civilisation to the system pursued in times quoted with such approbation—a system by which infant intelligence was tortured into intellectual precocity, and hurried to an early tomb by "maids, women, hot blankets, and excessive hot fires."

Most of our readers must be aware that Evelyn, the father of the unfortunate infant, was one of the most learned men of his time, and much celebrated for his translation of, and his essay prefixed to, the "*Golden Book of St. Chrysostom, concerning the Education of Children*."

86—Livy. G. N.—One of the best translations of Livy is that by Mr. George Baker, 12mo, 1833.

87—Hebrew Alphabet. C.—The Hebrew alphabet contains *twenty-two* letters. Their names may be found in regular order in the 119th Psalm.

88—Pronunciation of Magyar. J. J.—This word is pronounced as though written *Modjar*. The *a* has the sound of *o* in *dodge*; the *gy* that of *j* or *dj*.

89—French Language. S. B.—Among the best aids in obtaining an elementary knowledge of French, is Cobbet's *Grammar* of that language, which we can confidently recommend to our inquirer.

90—Angling. B. J. S.—In April, jack, carp, perch, roach, dace, chub, gudgeon, minnow, barbel, bleak, trout, tench, flounders, and eels, will take a bait, about the middle of the day, in shallows and eddies.

91—Electrotyping. S. C.—This is the art of depositing metals, held in solution by galvanism, on other metals; thus it is a perfect process of gilding. Impressions of medals, coins, &c. may be copied by it with perfect accuracy.

92—Translation of the Bible. E.—The first Protestant translation of the whole Bible is considered to be the joint production of Coverdale and Tyndale, and it is said that only two perfect copies are in existence; one in the British Museum, and the other in the possession of Lord Jersey. This work has a wood-cut title, and is dedicated to Henry the Eighth.

93—Hail. J. B. M.—Hail is rain which has passed in its descent to the earth through some cold bed of air, and has been frozen into drops of ice. To produce hail, there must be two strata of clouds having opposite electricities, or charged with positive and negative electricity, and two currents of wind. The lower cloud, being charged negatively, is the one which precipitates the hail.

94—Best time for eating Fruit. H. R. E.—“A notion generally prevails that fruit is less wholesome for eating in the morning than the evening; why is this?”—It is well known that fruits are more acid in the morning than in the evening, because the sun's rays decompose their carbonic acid, and make them part with their oxygen, of which they do not get a fresh supply until night.

95—Plants. C. R.—“Is it not the tendency of plants to seek the light, and what is the reason of this?”—It is a fact well known to all persons who cultivate house-flowers, that they require to be turned frequently, that they may grow straight. Some ascribe this to vital energy; but this is rather a vague reason, as we do not know in what his vital energy consists. Perhaps the chemical agency of light is the cause.

96—Exchange of Geological Specimens. S. C.—The proposition of our correspondent, T. H., No. 43, page 7, Appendix, vol. iii.) to exchange geological curiosities, has already awakened the attention of several lovers of the same science, who request to know the addresses of those parties willing to communicate with each other on the subject. We shall be very happy to give publicity to their names if they are forwarded to us for that purpose.

97—Green and Brown Leaves. G. P.—“You will think me very inquisitive for asking why leaves are green in summer, and change their tint

in autumn?” Leaves of plants are green because a chemical substance, called chlorophyll, is formed within their cells. This has the property of absorbing the *red* rays and reflecting the blue and yellow, which two unite, and produce *green*. Leaves turn brown in autumn because the chlorophyll undergoes decay, and is not replaced again as in spring.

98—Title of “Admiral.” G. L.—A full admiral ranks with a general in the army, a vice-admiral, with a lieutenant-general, and a rear-admiral, with a major-general. An admiral, who is actually the commander-in-chief of a fleet, ranks with a field-marshal. Admirals bear their pennants at the main-top-gallant-mast head; and rear-admirals at the mizen-top-gallant-mast head. There are three classes of admirals in England, those of the Red, the White, and the Blue. [The other questions of our correspondent being of a purely personal nature, we must refer him to some authority at the Admiralty.]

99—Instinct of Animals. J. J. R.—“Can we ascribe reasoning powers to animals? We know that they collect stores for the winter, build bridges, prepare for battles, concert upon plans to decoy their prey, besides an infinity of actions and pursuits that seem to indicate something more than mere instinct.”—There can be no doubt that some animals are impelled by mental action, very different, however, to that of man, and which does not elevate itself above some of the most elementary combinations of impressions received through the senses: combinations which the mind of the brute performs without consciousness.

100—Sabbath at all times. F. B.—“I have read somewhere that there is always a Sabbath, or day set apart for consecrated purposes among various people without intermission; will you tell me if this is the case?”—By different nations every day in the week is set apart for public worship: Sunday by the Christians, Monday by the Greeks, Tuesday by the Persians, Wednesday by the Assyrians, Thursday by the Egyptians, Friday by the Turks, and Saturday by the Jews. Add to this the fact of the diurnal revolution of the earth, giving every variation of longitude at a different hour, and it becomes apparent that every moment is Sabbath somewhere.

101—A Problem. H.—“Can any of your readers answer the following problem, which I have met with in an old work?—To find the number of pieces of money any person holds in the right or left hand, first holding as many pieces in one hand as the other. Bid the person holding the equal number of pieces in both hands, take a given number (possible) from the number of pieces held in one hand, and put them to the number of pieces held in the other hand; then bid the same person take as many pieces out of that hand into which the said given number of pieces were just put, as remained in the hand whence those pieces were taken, and put them back into the same hand; then there will be left in the other hand, exactly twice the given number of pieces that were first taken out of the contrary hand.”

102—Chemistry a desirable study for Females. J. D.—“A few ladies, who occasionally discuss the merits of the *Tutor*, wish to know whether you recommend the study of chemistry as a branch of female education?”—By all means. There cannot be a more delightful and instructive pursuit throughout the wide range of science, than chemis-

try, and its positive utility to the gentler sex cannot be denied. All household operations, such as the cooking and preparation of food for the table, the preservation of fruits and meats, and the best processes of cleansing, which duties are superintended by the mistress of a house, can only be best performed when the principles of chemistry are well understood. Besides this, the mind receives a development that can never be obtained by the cultivation of mere trivial accomplishments.

103—*A Billion.* G.—This is a million times a million, which no one is able to count, however easy it may be to write it. You can count 160 or 170 a minute, but let us even suppose that you go so far as 200 in a minute, then an hour will produce 12,000; a day, 288,000; and a year, or 365 days (for every four years you may rest a day from counting, during leap-year), 105,120,000. Supposing that Adam, at the beginning of his existence, had begun to count, had continued to do so, and was counting still, he would not, even now, according to the usually supposed age of our globe, have counted nearly enough. For, to count a billion, he would require 9,512 years, 34 days, 5 hours, and 20 minutes, according to the above rule.

104—*The First Printed Book.* R. F. L.—“When, and where, was the first book printed? I know it was the Bible; but pray inform me if there is a copy of this earliest printed work in existence?”—It is a remarkable circumstance that the inspired volume, that was to confer such inestimable blessings to the world, was the first production in the art of printing. This was accomplished at Mentz between the years 1450 and 1455. Guttemberg was the inventor of the art, and Faust, a goldsmith, furnished the necessary funds. Of this work, eighteen copies are now known to be in existence, four of which are printed on vellum. Two of these are in England, one being in the Grenville collection. Of the fourteen remaining copies, ten are in England, there being a copy in the libraries of Oxford, Edinburgh, and London, and seven in the collections of different noblemen.

105—*The Sovereigns of England.* P. W. W.—The lives of the kings and queens of England will be found in the best histories, such as Lingard's, Hume's, &c. Miss Strickland's work on the female sovereigns is justly popular. The following poetical list of the rulers of England from the Norman Conquest, may probably assist the memory of our correspondent, and obviate the difficulty he mentions:—

“First William the Norman; then William his son;
Henry, Stephen, and Henry; then Richard and John;
Next, Henry the third; Edwards, one, two and three;
And again, after Richard, three Henries we see.
Two Edwards, third Richard, if rightly I guess;
Two Henries, sixth Edward, Queen Mary, Queen Bess.
Then Jamie the Scotchman; then Charles whom they slew,
Yet received, after Cromwell, another Charles too.
Next Jamie the second ascended the throne,
Then William and Mary together came on;
Till Anne, four Georges and William all past,
God sent us Victoria—may she long be the last!”

106—*Early Closing.* B. W. H.—“I belong to a class of young men whose business avocations, often continued until a late hour in the evening, allow no time for study. The early closing movement, from not being generally adopted, does not benefit me. Will you give a few hints to employers,” &c.—We willingly answer the appeal of

our correspondent by urging upon the masters of public establishments the advantages and even necessity of a longer interval of repose to their assistants. The salutary influence exercised on the mind, by this cessation from labour, would be manifest in the increased activity and cheerfulness of those in service; while no loss could accrue to the employers if unanimity prevailed among them on this subject. To secure this concession, however, it is essential that young men should devote such leisure to wise and improving pursuits; and not by frivolous or unsteady conduct provoke the withdrawal of such indulgence.

107—*Studying Languages.* T. F. I.—“I am very desirous of studying French, and shall be glad if you can inform me the best way of doing so.”—No better authority can be given on this subject than Gibbon, who adopted an excellent method, which he thus describes:—“In my French and Latin translations, I chose some classic writer, such as Cicero and Vertôt, the most approved for purity and elegance of style. I translated, for instance, an epistle of Cicero into French, and after throwing it aside till the words and phrases were obliterated from my memory, I retranslated my French into such Latin as I could find, and then compared each sentence of my imperfect version with the ease, the grace, the propriety of the Roman orator. By degrees I was more satisfied with myself, and I persevered in the practice of these double translations, till I had acquired the knowledge of both idioms, and the command, at least, of a correct style.”

108—*Difference in the Understandings of Men.* P. C. F.—“What is the reason that men differ so much in their style of writing, that we are frequently enabled to detect an author by his composition?”—A treatise might be written on this subject, so many explanations can be given why such difference of thought should exist. We will, however, merely state the opinions of Hume on this subject:—“One man has a better memory than another, and can apply his attention better; which leads him to reason better, from what he has read and learnt. Or is better able to comprehend the whole system of objects than another, and, of course, can infer more justly their consequences, can carry on a chain of consequences to a greater length than another. Few men can think long, without running into a confusion of ideas, and mistaking one thing for another; and there are various degrees of this infirmity. The circumstance on which the effect depends is frequently involved in other circumstances, which are foreign and extrinsic; the separation of it often requires attention, accuracy, and subtlety. Forming of general maxims from particular observation, is a very nice operation, and nothing is more common, from haste and narrowness of mind, than to commit mistakes in this particular. In reasoning from analogy, he who has the greatest experience, or the greatest promptitude of suggesting analogies, will be the better reasoner. Biasses from prejudice, education, passion, party, &c., hang more on one mind than another. After we have acquired a confidence in human testimony, books and conversation enlarge more the sphere of one man's experience and thought, than those of another. It would be easy to discover many other circumstances that make a difference in the understandings of men.”

POPULAR GEOLOGY.

CHAPTER IX.—SECONDARY STRATA: THE NEW RED SANDSTONE, AND THE OOLITIC SYSTEMS.

Deposition of the New Red Sandstone.—Upon and around the ruins, so to speak, of the carboniferous system, when broken up by violent volcanic action, were gradually deposited by the renewed activities of nature, the strata known under the above designation. These include Red Sandstone, Variegated Shales, of yellow, purplish, and green colours (the green arising from the presence of oxide of copper), and Magnesian limestones, of a creamy colour, existing in thick beds, and frequently presenting interesting forms of structure, resembling now honeycombs, now bunches of grapes, &c.

The Colour of the Red Sandstone involves some interesting points of study. The grains of which it is in a great measure composed, are not red, but consist of white, rolled, quartz sand, surrounded "like varnish" with the red peroxide of iron. From whence could the immense quantities of iron be obtained that were sufficient to colour the sedimentary deposits in question to the depth, perhaps, of a thousand yards, and over large portions of the world? Some writers say it could not possibly have been derived from the disintegration of the older rocks (though this is denied by Sir C. Lyell, who says the hornblende or mica contains the oxide of iron in sufficient abundance), and that, therefore, we must look to volcanic action as the true agency, which, to this day, is constantly ejecting the mineral referred to.

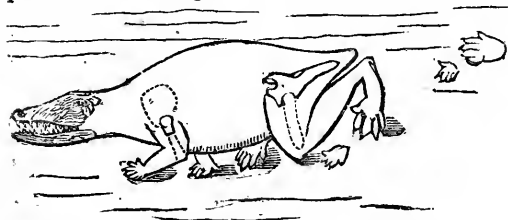
Salt forms a characteristic feature of this system of strata, and is found in various forms, as rock-salt, and salt-springs; the latter issuing from the shales, which are often thickly impregnated with saline matter, or formed by the decomposition of the buried rock-salt in the lines of currents of water. Sir C. Lyell illustrates his views as to the formation of rock-salt, by referring to an extensive plain in India, about the fourth part of the size of Ireland, called the Runn of Cutch, which is covered during a part of the year by the sea, and dry during the remainder, and then shows an incrustation of salt to the depth of an inch or two, caused by the evaporation of salt water. Now, supposing this plain to have sunk slowly for a great length of time, while the country still preserved the same generally horizontal direction, there would be, of course, a constant increase of salt by annual deposits, until even such depths might be attained, as we find in the beds of salt of Northwich, in Cheshire, where there are two beds, measuring respectively ninety and a hundred feet deep, and extending horizontally, it is supposed, for a great distance. Among the most interesting of salt mines are those of Salzburg, in Austria, in the heart of a mountain, and which has been worked from time immemorial. The rock-salt is found there of different colours, but chiefly blue, grey, and yellow. In one part of these mines the visitor finds himself in a kind of chamber, with a roof about seventeen hundred and eighty feet in circumference, perfectly flat, and bearing, without any central support, the entire weight of the mountain above. There are thirty or forty of these chambers, though not of the same gigantic size. The length of the mine exceeds two thousand yards; the depth is about three hundred and fourteen.

We do not, naturally, attach any ideas of a beautiful and luxuriant vegetation to soils saturated with salt, yet travellers give a charming picture of some of the salt lakes of Africa. Here is an example. The lake in question lies in the midst of an extensive plain, is of an oval form, about three miles round, and has on one side a sloping margin of green turf; while the other presents banks, more or less elevated and abrupt, covered with thickets of trees, and succulent plants. At times, the whole of the margin of the lake, and much of its surface, is covered with a thick rind of salt, sprinkled over with snow-white crystals, the whole presenting the appearance of a frozen pond, covered with the beautiful hoar-frost. This wintry aspect of the lake is strikingly contrasted with the

luxuriant vegetation in which it is embowered, where woods of fine evergreens, and elegant acacias, are richly intermingled with flowering shrubs, and succulent plants of lofty size and exotic character—such as the plant of which the elephant is so fond, the *Portulacaria afra*, the tree crassula, the scarlet cotyledon, many species of aloes—some throwing out their clusters of flowers over the edge of the lake, others elevating their superb tiaras of blood-red blossoms to the height of twelve or fifteen feet; and, high over all, gigantic groves of *Euphorbia*, extending their leafless arms above the far-spread forest of shrubbery. The effect of the whole, flushed with a rosy tinge by the setting sun, is singularly striking and beautiful. Such lakes are supposed to be derived from salt-springs.

The Organic Remains of the New red sandstone system are singularly few, but highly interesting, as illustrating, both by their scarcity and their character, the nature of the great changes that took place in the sea and land when it was formed. The first thing that arrests our attention, is the fact that here, as in the Old red sandstone, we find the colour, arising from the presence of iron, to be connected, apparently as cause and effect, with a great destruction of animal and vegetable life, and which only slowly revived afterwards, as the conditions of soil and atmosphere became more favourable. Thus, the thousand specific forms that existed in the carboniferous era, were now reduced to about one hundred and sixty-six. Among these, the corals alone dropped from about a hundred to fifteen; and of the latter, only three or four are found plentifully. A single crinoidea, rarely found, alone represents that previously flourishing family, so characteristic of previous formations. The trilobite has gone altogether. These, and similar facts, cause the earlier part of the era (designated as Perinean by some geologists) to be looked on as the close of the Palæozoic period—that is to say, of the period of the most ancient forms of existence. On this topic we must, however, observe in passing, that there is nowhere to be found in geology a period exhibiting a complete change. However great the latter may be, however attenuated the flow of life may become in passing from era to era, it never absolutely ceases in order to allow an entirely new creation to appear. This is so true in connexion with the period under notice, that it would seem as though especial care had been taken to impress the truth upon all future observers; for, while a great decrease takes place, it is quite remarkable how the fossil plants, shells, fishes, and reptiles, partake at once of the character of those that preceded, and of those that were to follow. Calamites, like those we have described as belonging to the Coal measures, are found side by side with the Cycadeæ, of which we shall have to speak in connexion with the next system of strata—the Oolitic. Productæ, like those of the Mountain limestone, are discovered in the Magnesian limestone, with *Terebratulæ*, similar to those of the lias and oolites of the said Oolitic formation. And while old forms are dying out, new ones are also appearing. If the fishes of the genus *Palæosaurus* now are found for the last time, the oviparous quadrupeds, *Protosaurus* and *Phytosaurus*, now first make their appearance.

The Footmarks of Animals that have, so far as we know, left no other record of their presence on the globe, now become numerous, and proportionably interesting. They



LABYRINTHODON PACHYGNOTHUS.

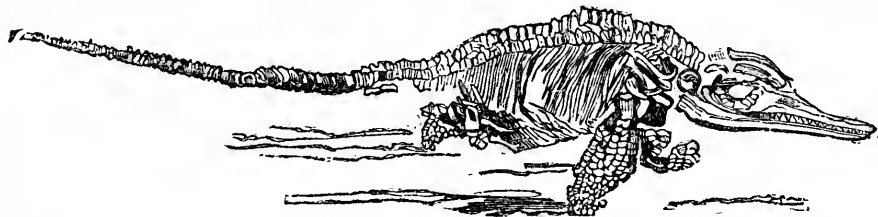
are found in different countries, and as representing very different classes. Some were found in the quarry of Corn-cockle Muir, Dumfriesshire, where the sandstone, that was formerly sea-beach, lies at an inclined angle of thirty-eight degrees. Up and down this slope the footmarks are traced, as though they belonged to an animal which had daily passed to and fro in its visits to the sea. Other marks were observed in the Storton quarries, on the west side of the Mersey, Cheshire, imprinted on fine thin beds of clay, ranged one above another, separated by beds of sandstone. Each of these thin seams of clay had probably been, at one time, the surface of the

ground; then submerged, a sand deposit left on it; again raised, and a new clay surface formed, and so on repeatedly. The animals here referred to, have been determined, after a long and rigorous investigation, to belong to the Batrachians, or frog family. One great living natural philosopher, Professor Owen, has shown how he conceives such footprints to have been made, by a restoration of the kind of animal that made them.

It is in the United States that these footmarks have been found in the greatest variety and number. There, in the rocky banks of the Connecticut, some thirty-two species of bipeds; and twelve of quadrupeds, have been discovered. The tracks have been found in more than twenty places, extending over eighty miles of territory, and including above two thousand distinct impressions. Many of these are the footprints of *birds*, belonging, it is supposed, to the families of *Waders* and *Scrapers*. The size of some of the bird-footprints greatly exceeds those of the largest living ostrich, and certain naturalists were, at first, incredulous as to their having been really made by birds; but recent discoveries of gigantic birds in New Zealand have entirely removed this difficulty—even acknowledging it to be one.

Rain-drops of Remote Eras.—It almost sounds like an incident from a fairy tale to say that we can, by the means of geological science, raise before the mental eye facts of the most ordinary daily character, in connexion with periods too remote for us even to calculate in years—yet that we can do so is certain; for instance, we can not only see, as it were, the very rain falling on a day belonging to such a period, but tell from what direction it came. On certain slabs of sandstone—the Greensill, near Shrewsbury—the hollows formed by rain-drops are clearly to be recognised, and their rims being raised on one side, shows that they had fallen from a slanting shower, as well as the direction of the slant.

The Shell-limestone, or Muschelkalk fossils.—The strata known as Muschelkalk (shell limestone), which is missing from the system in England, but which is found richly developed in Germany, is especially remarkable for the fossil reptiles discovered in it, belonging to the marine saurians. Pretty monsters some of these were! There was the Ichthyosaurus, or Fish-Lizard, some thirty feet long, with the form of a fish, and some of the qualities of more highly organised animals. It had a fish's tail, crocodile's head, paddle-fins like the whale, a skin resembling that of the cetaceous



THE ICHTHYOSAURUS.

animals (whale family), and its breast-bone resembling in structure that of the Australian duck-rat. Its horrid jaws expanded to the extent of seven feet at a stretch; and, while such provision was made for dealing with its prey, the eye seemed constructed on a scale of equal efficiency for showing where the prey was to be found, for it had a socket eighteen inches in diameter.

The Igneous rocks, associated with the New red sandstone, are chiefly green stone, found in the form of dykes, which have been driven upward through the Old red sandstone, Coal measures, and Magnesian limestone.

Localities.—The system is largely developed in the central districts of England; also in France, Germany, Poland, the flanks of the Alps, the United States of America, &c. The series of strata is found peculiarly rich in Germany, where one member of it—the Muschelkalk—is found above the Magnesian limestone, and below the lias of

the Oolitic formation ; while, as we have said before, it is altogether absent in England. At Thuringia, in Saxony, the Magnesian limestone is found so highly developed, as to be deemed by geologists peculiarly its "classic ground."

The Scenery of the New Red Sandstone is not particularly attractive. Pleasant, but flat, might be said of it. The rounded terraces and eminences of the Magnesian limestone, with their thick and verdant sward—the level expanse and fertile surface soil of the red sandstone—and the wide marshes formed by the shale, are the chief elements of such variety as the landscapes of this system afford.

Uses.—Reduced to quick-lime the Magnesian limestone becomes valuable for mortar and manure. It also furnishes the magnesia of the chemist's shop. Its more dignified use is that to which the finest specimens are appropriated, namely, for the erection of such piles as the New Houses of Parliament; the Magnesian stone from Bolsover moor being thus used. Some of the slaty limestones are used by lithographers, the best German stones being obtained for this purpose. The marls afford us their useful contribution in the shape of gypsum for manure.

The Oolitic System.

Deposition of the Oolitic System.—Again, as if to make up for the destructive agencies of the New Red Sandstone System, stupendous restorative ones were at work in the period that followed ; and, in consequence, that period, the Oolitic, is characterised by an abundance and high development of life not unworthy of comparison with the luxuriance of being already noted in the carboniferous era. The material preparations for this increase may be briefly noted. By fresh upheavings and submergings of the earth's crust, the red sandstones gave place to yellow calcareous grits ; the variegated and salt-impregnated marls to blue clay, mixed with iron pyrites ; the magnesian rocks to oolitic limestones, whose peculiar texture gives name to the whole system. Sir C. Lyell thus describes the origin of this system:—"We must conceive a sea in which the growth of coral reefs, and shelly limestones, after proceeding without interruption for ages, was liable to be suddenly stopped by the deposition of clayey sediment. Then, again, the argillaceous matter, devoid of coral, was deposited for ages, and attained a thickness of hundreds of feet, until another period arrived, when the same space was again occupied by calcareous sand, or solid rocks of shells and coral, to be again succeeded by the recurrence of another period of argillaceous deposition."

Meaning of the Term.—Oolite is derived from *oon*—an egg, and *lithos*—stone, in reference to the novel structure of the stone in question. This consists of rounded calcareous particles, varying in size from as large as marbles to as small as millet seed, and the larger of which contain broken shells. The particles are probably of chemical origin.

Division of the System.—It consists of three groups:—The Lias, the Oolite proper, and the Wealden clay.

The Lias, a corruption of layer, is known generally by the dark hues that prevail among its strata, and which comprise dark clayey limestones, whose fine stratification shows it to have been deposited in tranquil waters ; bluish clays, the predominant member of the group, and which occur interstratified with layers of jet, and other coal, ironstone, and limestones ; and lastly, shales, occasionally impregnated with salt, sulphates of magnesia, and soda, whilst many abound in iron pyrites, and bituminous matter. Parts of the sea-cliffs of Yorkshire, thus composed, are said to ignite spontaneously, and to burn for several months together.

The Oolite Proper includes, besides oolitic limestones, calcareous conglomerates of sand, lime, and shells ; also yellowish sands, and calcareous clays.

The Dirt bed occurs above the Oolite proper, and is found in Weymouth and other places. This is a thin stratum of soil, just like the surface soil of our own time, and full of remains of tropical trees.

The Wealden Clay occurs highest of all in the series. It derives its name from the Wealds of Kent and Sussex, where it is largely developed. The dry land, forming the dirt bed just mentioned, is supposed to have afterwards become an estuary, including the whole south-east province of England, and which formed the mouth of some river belonging to the grandest scale of rivers, such, for instance, as the Mississippi. It has been surmised that this particular river may have flowed from a point not nearer than the site of Newfoundland, with, of course, banks extending all the way. How the Wealden clay was formed in this estuary, Sir H. De la Beche thus describes :—"Much calcareous matter was first deposited, and in it were entombed myriads of shells, apparently analogous to those of the Vivipara. Then came a thick envelope of sand, sometimes interstratified with mud; and, finally, muddy matter prevailed. The solid surface beneath the waters would appear to have suffered a long-continued and gradual depression, which was as gradually filled, or nearly so, with transported matter. In the end, however, after a depression of several hundred feet, the seas again entered upon the area, not suddenly or violently, for the Wealden rocks pass gradually into the superincumbent cretaceous series, but so quietly, that the mud containing the remains of terrestrial and fresh-water creatures, was tranquilly covered by sand, replete with marine exuviae.

Contents of the Wealden Group.—It includes beds of dark blue clay with ironstones in nodules, argillaceous limestone, impure oolites, and sandstone deeply impregnated with iron: in fact, oxide of iron is diffused through—and to a certain and varying extent colours—the whole group.

Animal Life.—Among the many fossils found in the Oolitic systems it is difficult to make a selection—they are so numerous, and present so many features of high zoological and geological interest. We find zoophytes approaching those of our own era; Crinoidea, which are few and dwarf compared with their predecessors; Star-fishes; Sea-urchins; Shell-fishes, including Ammonites, Belemnites, Gryphæa, Trigonina and Ostrea; Annulosa like the common earth-worm; Crustacea, including the king-crab, which—appearing at the very time that the trilobite (the animal it most nearly resembles) disappears—forms one of those links by which Nature loves to bind all her works together in an unbroken series; Insects, like the beetle and dragon-fly, which were discovered in the slaty limestones of the Oolite proper at Stonesfield, in England; Fishes, presenting the *regular* enamelled scale that marks the Ganoid order, and the unequally divided tail, a feature which is confined to a few of our existing fishes, but was universal with the fish of the magnesian limestone and all earlier formations; Sauroid reptiles, like existing crocodiles, tortoises, and turtles, but differing widely in their habits; Flying Lizards, and lastly, Mammalia, now first appearing on the surface of the globe, in the shape of animals allied to the Opossum family. Of all these, the Sea-urchins and Shell-fish, as Ammonites, Belemnites, Gryphæa, &c., the Sauroid Reptiles, the Flying Lizards, and the Mammalia, form the most characteristic animals of the era. The Belemnites (allied to the cuttle-fish) had an ink-bag with which to discolour the water, and so conceal it from enemies. Some of that very pigment has been used in our own times by an artist to depict the fossil Belemnite itself! As to the Sauroid Reptiles, the oolitic eras may be called *their* era—so abundant are their relics in the lias and superincumbent strata. The flying lizards form, perhaps, the most extraordinary of all the creatures that geology makes known to us. They were about the size of the cormorant, but had bat-like wings extended upon the fore-finger, with which to fly. The ichthyosaurus, already spoken of in connexion with the German shell-limestone, now also occurs in the lias of this country. But most interesting of all are the mammalia, the first of the series of which Man was to be the last. Our earliest glimpse of the animals in question occur in the Stonesfield slate, where several specimens of jaw-bones have been found, and which have been compelled to give up the secrets of their past life in answer to the potent spells of modern science. They are now believed to be the remains of marsupialia, to which belong the kangaroo, and other animals that now characterise the Australian zoology. It is a remarkable circumstance that this animal is not the only

thing that suggests a connexion between England as it was, and Australia as it is. In and around the latter are still found various animals and plants that are closely allied to many of both that were rife in the oolitic and other early periods. Among animals, for instance, *Cestracion*, *Trigonia*, *Terebratulæ*; among plants, the *Zamia*, Tree-fern, *Araucarias*, and *Cycadeous* plants. The latter forms the most characteristic feature of the vegetation of the oolitic period; their stems, fruit, and leaves are found in great abundance in the fresh-water Wealden, intermingled with stumps and prostrate trunks of trees. They form a tribe intermediate as it were between palms and conifers, having a tall, straight trunk, and a crown of magnificent foliage.

The Igneous Rocks associated with the Oolitic system represent, apparently, the last efforts of the trappean era. The volcanic forces now suffice to send up occasional outbursts of trap-tuff, or intersecting dykes of greenstone, and that is all.

Localities and Scenery.—The Oolitic system is very fully developed in England—especially in the eastern sea-coast from Yorkshire to Dorset—in France, Westphalia, Northern India, Africa, &c. The contour of such countries is that of gentle undulation, formed by rounded limestone heights, and intervening valleys of clay.

Uses.—From the lias limestone, deeply impregnated with iron, there is formed, after burning, a lime that sets under water. Lithographers' stones are also obtained from the lias. Alum is formed by burning the lias clay that contains iron pyrites; these give forth sulphur, which, with oxygen from the air, and alumina from the shales, form alum. In the upper beds of oolite, fullers' earth is found in beds of great depth. Some Oolitic sandstones, such as those of Bath and Portland, make excellent building-stone; and others, ornamental marbles. Lastly, the common paving-stones of London streets are drawn from the Purbeck quarries of the Wealden clay.

Revival of the Oolitic Period.—We cannot better conclude our present chapter than with a passage of rare eloquence, devoted to the period we have just reviewed. "The imagination," says the author of the *Vestiges of Creation*, "eagerly aspires to picture the world of the Oolitic era, when there were scarcely any living creatures of more exalted character than reptiles. There were then vast tracts of dry land, as now; their surface bore a luxuriant vegetation of no mean kind. The meteoric agencies, the rise and fall of tides, were common phenomena of that time, as of the present. Day after day, through long-drawn ages, the sun passed on his course. Night after night the sparkling garniture of the sky looked down on this green world. But a being of superhuman intelligence, coming to examine our globe, would have seen all this existing only for fishes, and still humbler creatures in the sea; and for reptiles, insects, and perhaps a few birds, and still fewer opossums, upon land. He would have beheld the tyrant sauria pursuing their carnivorous instincts upon the wave, upon the shore, and even in the air; huge turtles creeping along the muddy coasts; still more huge megalosaurus, traversing the plain; and, with all this, the air filled with multitudes of insects. But no flocks would have met his eye upon the mountains, no herds quietly roaming in the valleys. He would encounter no tiger or elephant in the jungle. None of the smaller mammalian quadrupeds—as the dog, the genet, the hedgehog, the hare, the mole—would have presented themselves. And not only were no human beings to be seen, but our supernatural visitant would know that this scene must lie spread out, in perfect capability for their reception, during whole millenniums, before such beings were to exist; the stream flowing and glittering in the sun, but not to cheer the eye of man; the season passing, but not to yield its fruit to him; the whole jocund earth spread out in unenjoyed beauty, as yet unwitting of the glory and gloom which human impulses were to bring upon it. How strange to reflect on the contemplations of the supposed visitant! What a vast void! What a stretch of time before there was to be even a commencement to its proper filling! And yet the certainty that in good time, in the ripeness of the plans of the mighty Author, the higher animals were to come, and among the last, the creature of creatures—who, in his infinity of device, was to turn it all to his use—the historical being of the world!"

THE MIRROR OF NATURE.

INTRODUCTION.

WE now commence, in *The Family Tutor*, an excellent work, translated by W. H. Furness, Esq., from the German of G. H. SCHUBERT. The perusal of this work has afforded the *Tutor* great pleasure, and he offers it to his pupils in the full confidence that they will find it highly instructive and delightful. The author is known in his own country as an eminent naturalist, a veteran devotee of science and philosophy, and a traveller in the East. In his own Preface, he states it to be his design to furnish "riper youth" with important elementary knowledge, and in a pleasing and simple manner. In this object he has succeeded admirably. Facts and principles are blended together in a poetic harmony, developing a sound philosophy, pointing to God. To all young inquirers, in whom the desire for knowledge is awakened, this translation is dedicated. The *Tutor* will carefully watch the translation of scientific technicalities, so that the utility of this excellent work may not be marred by obscure or unintelligible language.

PART I.

THE IMPULSE TO BEING AND KNOWING.

1.—ALL WANT SOMETHING.

WHEN the stone, or any other inanimate body, is taken from the place where it rested, and then set in motion in another, perhaps far distant place, it continues in that motion till it has again found a halting and resting place. To the force of gravity it remains, indeed, indifferent whether the point of rest be near or far from the rock from which the stone was broken—whether it be at the bottom of the sea, or in the human hand that holds the stone, or on the firm surface of the earth; the stone will never, of its own power, return to the spot whence it came.

Quite different is the case with those living beings who, by an inherent force,

and by their own power, are removed from the place where they arose, and carried to far distances. The salmon is born far from the mouths of great streams and from the sea-coasts, in the fresh waters of brooks and rivulets, in the vicinity of their sources. There, when it issues from the egg, it finds for the first time the most appropriate element, and the most fitting nourishment. When it becomes somewhat larger and stronger, it leaves this place of its birth, swims down the stream, and goes to the sea-coast, and deeper into the sea, after its prey—which consists of other water-animals. But when the time approaches for it to bring forth, then, in the midst of the nourishment that surrounds it, the longing for home leaves it no rest. The egg-laying females, in company with their partners, swim in shoals up the rivers and their branches, to introduce their brood into life on the same spot where they themselves first came from the egg. If you catch a female salmon in the spot where it has spawned, and make a mark on one of its fins, you may convince yourself that instinct leads the fish back every year to the same place; and when you take the eggs, which the same fish has laid, out of the water, and carry them in a vessel of water to another place in another river, in which salmon have never been known, you lay the basis of a gradual population of salmon in a new spot. For although fishes, as they increase in size, leave their birth-place, and take up their usual residence at a great distance, yet, when they are ready to produce a new generation of their kind, they return every year back to the same spot where they themselves were young. And so is it known to be in regard to all fishes that, at the time of spawning, seek a certain region of the shore, that they yearly return to the same place—the place of their own nativity. In such cases, certainly, the wandering impulse toward home appears to have a holding-point and guiding-thread in the memory of the animal, for the old salmon returns homeward by the same way he went forth. But even without such a leading-thread, the destined goal is reached by that force which connects the two ends of life, and brings its course back to the starting point. A sea-tortoise was caught near the Island of Ascension, and brought on shipboard. On its under shell, certain

letters and ciphers were branded. The design was to carry it to Europe, but growing sick on the voyage, and appearing nearly dead, it was thrown overboard in the British channel. Two years afterwards, the same tortoise, sound and well, was again caught in the neighbourhood of the same Island of Ascension. Led by the longing for home, it had made its way through the water a distance of more than eight hundred German miles.* Over as great, or not inferior, distances, the journeys of the bird of passage extend; and yet, at the time of pairing, they all return whither they themselves were born, and, in the vicinity of the nest in which they emerged from the egg, build their nests for their young.

Not merely from quite different lands and climes, but also from very dissimilar elements, the out-running circle of animal life returns to its starting point. The horse-fly and the gnat come forth from the maternal egg in water, and in water the first period of their life is spent. Afterwards they become dwellers of the air, and enjoy the pleasure and freedom of a winged condition. Nevertheless, when she is to lay her eggs, the mother returns to the water; and so the female of the May-beetle forsakes the top of the high oak for the ground; and even the tree-frog leaves her green house in order to produce her young in the same place where she first saw the light—in the water. On the other hand, the helpless sea-tortoise, at the fit time, ventures out upon the land to lay its eggs in the sunny sand-bed, in which itself was born. The butterfly, who hovers in its beautiful day from flower to flower, and sucks their honey, seeks nevertheless, when its time comes, the unsightly nettle in order to lay its eggs on the leaves, from which it first drew its own nourishment.

In a somewhat changed form appears the attracting force, which chains the living to a certain abode, in the case of those mammalia which man has taken under his care and culture. Even among these it is, indeed, often their being accustomed to a certain feeding-place or stall, which draws them from far distances, or which makes the herds leap and low with joy when they

return from their beautiful summer abode on the Alps to the neighbourhood of their native village. Even the attractive society of their own brute companions works so powerfully, that those goats that have escaped from man and enjoyed for years the free life of the chamois, cannot resist the charm of old associates, and the accustomed stall, when once again they hear the tinkling of the bells worn by their former herd. In many other cases a deeper reason for this home-longing is to be discerned. It is not merely the crib, but the crib of *his master* which the generous steed longs for; and the faithful dog, escaped from confinement, hastens back, many days march, not only to the dwelling of his master, but to his master himself, to whose person he is bound by grateful love. Thus may that force, which among all living animals, leads them back to the parental home or to the places where, without parental help, life received its first care, be related to those emotions, which, in the bosom of man, are fashioned to gratitude and love.

Even man himself, in many cases, is overpowered by a longing for the place of his birth, for the residence of his early childhood. He is, however, less bound by the force which connects him with an external home than any other living creature. He rather goes in obedience to his inclination, like the wandering dove, to such places of abode as best afford him the means of subsistence. But in his inner spiritual being he is truly at home only, where those are whom he loves. Therefore, Jacob de Vries, in the midst of the earthly paradise of Cape Colony, felt a continual homesickness for poor cold Greenland, because there he had enjoyed the love of human hearts, dearer and more precious to him than all the perfumes of the flowers, and all the deliciousness of the fruits of a warm beautiful land. Finally, from the case of human beings, whose true home and spiritual birth-place is not in the visible world, it is most clearly evident that the longing for home among all living creatures is the aspiration of gratitude, conscious or unconscious, to the origin and spring of life and all its joys. In the heart-sickening desire of home, which affects the wanderer from barren Lapland, as well as the Swiss, amidst the bustle of London, there mingles unmarked, with the longing for the holy

* A German mile is four and three-fifths English miles.

peace which childhood possesses, the remembrance of the love first enjoyed by man at his entrance into life, when he lay in his mother's arms.

Our father's house, however poor,
Nought on earth do we love more.

II.—INSTINCT.

The word Instinct, Impulse, has been used from of old to designate particularly that disposition of the human mind, which results not from consideration and forethought, but from a higher suggestion; hence the ancients spoke not of an impulse merely, but of a divine impulse (*instinctus divinus*.)

An acquaintance of the celebrated French writer, Madame Beaumont, desired to make an excursion upon the river with some friends. When all was ready, and he was about to enter the boat with the rest, his deaf and dumb sister came to him in anxious haste, and sought to hold him fast, seizing his arm and his garments, and when this did not move him to remain on shore, she threw herself at his feet, embraced his knees, and gave him, by the most imploring gestures, to understand her entreaty that he would give up the excursion. The expression of pain in the looks and gestures of the deaf and dumb touched several persons in the company, and they begged the brother to yield to the wish of his poor sister, and relinquish the idea of going with them. Fortunately for him he complied, for the boat was upset, and several of the passengers were drowned; a lot which would have befallen him likewise, as he could not swim, had he not been warned, as through a divine impulse, by his deaf and dumb sister.

The child of three years of age, that, at the siege of Vienna by the Turks, in 1683, extinguished with earth a bomb, which had fallen into the city on a spot where it would have done much harm, also acted from such a divine impulse, for the safety of many.

A rich proprietor, once at a late hour of the night, felt himself urged to send various articles of food to a poor family in his neighbourhood. "Why at this moment?" asked his people, "will there not be time enough in the morning?" "No," said the gentleman, "it must be done now." He knew not how urgently his benefaction

was needed by the inmates of the poor hut. There, the father, the provider and nourisher, had suddenly fallen sick, the mother was feeble, the children had been crying in vain, since the day before, for bread, and the youngest was at the point of death: at once the distress was relieved. So also another gentleman, who, if I mistake not, dwelt in Silesia, felt himself impelled by an irresistible impulse to rise in the night and go down into his garden. He rose, went down; the inward impulse led him through the gate in his garden into the field, and here he was just in time to save a miner, who, in ascending from the mine, had slipped, and in falling, had caught hold of the tub of coal which his son was drawing up by a windlass, but which, on account of its sudden increase of weight, he was no longer able to hold without assistance. A worthy clergyman, in England, felt himself also on a certain occasion urged, late at night, to visit a friend suffering from melancholy, who dwelt at a considerable distance from him. Fatigued though he was with the labours of the day, yet he could not resist the impulse; he took the way to his friend, and came upon him just as he was about to lay violent hands on himself: he was saved from this danger for ever by the visit and consolatory words of his midnight guest.

Many such cases might be related, in which individuals, by a sudden impulse, have become the saviours of others, or even of their fatherland—like Arnold Winkelried, when at the battle of Sempach, he with heroic resolution caught the hostile spears, and pressed them down with his pierced body to the ground, and so broke the firm ranks of the foe. But the good impulse does not always concern the welfare and rescue of another's life, but as often, and perhaps still oftener, our own life. So Professor Boehmer, in Marburg, once, when seated in a circle of friends, felt himself inwardly moved to go home and move away his bed from the place where it stood. When he had done this, he was able to return to the company; but at night while he was asleep, the ceiling over that part of his room where his bed had previously stood, fell down, and had it not been for the change which an inward impulse had prompted, he would have been crushed.

How, in a case of imminent danger, one is prompted to seize a means of preservation, which is shown in the sequel to be the very best, many have experienced in themselves, and we shall hereafter mention some instances in point. And thus, in the nature of man, phenomena are presented which are very similar to those suggestions and promptings of instinct which guide animals in the choice of the means which serve for the support and preservation of their own lives, for the welfare of their young, and for the weal of the great whole, of which every individual animal is a part.

Besides, the animal cannot be guided in its action, like man, by intelligent consideration, and as little by experience, because it plays the part which instinct assigns it, immediately upon its entrance into life with perfect promptitude. A chicken, which had been hatched—not by a mother, but in a little artificial brooding-oven, descried, just as it had broken out from the shell of the egg, a spider, which it sprang at and seized as skilfully as if it had been long practised in the art of catching insects. When the young of the sea-tortoise in the bed of sand, which is their birth-place, have crawled out of the egg, they hasten immediately in a straight line to the sea. You may turn them from this course any way you please; you may obstruct their way with stones and sand-hills, which cut off their path, still they will always turn straight towards the sea. On the other hand, the young of the land-crab, which first came out of the egg under water, soon after their birth make for the land, and there seek out for themselves the situation best adapted to their subsistence. Scarcely has the ant crawled out of its chrysalis, or pupa-state, (commonly called the ant-egg) when, if it is of the sex of the workers, it immediately joins its elder associates in the business of gathering and carrying food for the helpless little larvæ of the community, and assists with all diligence in the work of building, as well as in transferring hither and thither the pupæ and the eggs. And it is not, as might be thought, only a blind imitation of the activity of the rest, which leads the novice on the path of its natural destination; for when the new-born ant is not of the sex of the workers, but is a male, or one of the more perfect females, then it does not

permit itself to be hurried away by the busy stream, it goes directly the way of its own calling, through the troops of the rest, out into the open space, where it rises into the air on the tender wings which are furnished to the males and the perfect females for the purposes of swarming.

That it is not the imitation of the instinctive actions of others of the same species, which directs each individual to its own mode of proceeding, is evident in every way. Nightingales and thrushes, which have been taken from the nest young, and reared far from their species, when they are let loose in the spring, build just such nests for their young as other birds of the same kinds. A beaver, which had been taken from its parents before its eyes were open, and which had been supported by a woman's milk until it was large enough to take the usual food of its race, arranged the broken twigs, from which it had eaten the bark, in a corner of its cage, one over the other, and when some earth was given it, it formed it with its fore-feet into little balls, laid these upon one another, pressed them together with its nose, and inserted into them a piece of wood. In this instance, the art of building, observable in other beavers, manifested itself independently of any possible influence of imitation.

It is their inborn instinct which, when animals are transported to countries and amidst vegetables and other animals entirely new, informs them what may be conducive, and what injurious to their subsistence. Horses, carried from Europe to Southern Africa, that had never been near a living lion, trembled for terror in every limb, when they, for the first time, heard the lion's roar. Ferrets which have been born and reared under the care of man, and have never seen a poisonous viper, attack a reptile of this class with great caution, aiming first of all to crush its head, while they have often won an easy victory over snakes not poisonous, which they seize, without a moment's hesitation, by any part of the body. Every animal, in conflict with another, instantly knows the weakest and most vulnerable side of its opponent; and also, on the other hand, how to guard that part of its own body which is most liable to injury. Thus the tiger, doing battle with the elephant, springs first at the trunk of his foe, which the elephant

guards against attack with the greatest care, in order, at the right moment, to use it with effect; the wild horse, assailed by the beast of prey, endeavours to guard his head and breast while he meets the enemy all the more vigorously with the hoofs of his hinder feet. The American domestic swine takes care to present his bristly neck to the bite of the springing reptile, in fighting with the rattle-snake, but at the same time to guard his snout, and at the right moment to trample upon the head of his dangerous enemy.

Even in a country new to the animal and to its progenitors, the sheep and the goat know how to find wholesome fodder, and to avoid that which is hurtful. The ape digs for roots, of which it has never eaten, guided by the scent, and never lets itself be allured by the innocent looks of what is poisonous. Certain cows of European breed, which an immigrant had taken with him to his new possessions in America, were, through the unexpected duration of the first winter, in great danger of starvation, and reduced to living skeletons. It was remarked that, as often as the barn door was opened, they all turned their heads out to a particular quarter, and, with loud lowings, endeavoured to make their longings to be understood. At last they were let loose and permitted to go out into the open fields, although not a single green thing was visible above the surface of the snow. The hungry animals instantly ran with the greatest haste down into a valley, where, in swampy ground, on the borders of a stream, stood a plant which none of the colonists had distinguished as calculated for fodder, for it exactly resembled our ordinary shavegrass or horsetail. But the kine, guided more surely by their instinct than man by his comparing and calculating reason, ate eagerly of this plant, and, by the continued use of the same, were soon restored to flesh and strength.

Mightier still, and in much more striking ways, does instinct show itself in connexion with parental love. When excited in the defence of their young, animals disregard every danger which threatens their own lives; maternal tenderness leads even the clumsy whale always into the vicinity of the spot where she has been robbed of her young, and where she is then easily caught, and the same maternal love, faithful unto

death, is observed in the sea-otter and several others of the mammalia of the waters.

When in the case of the prolific female ant, the time has come in which its eggs must be laid, then the instinct, which a few days before, led it out into the free air to dance merrily in the warm sunshine, takes quite a different and opposite direction. The troops of dancers with their partners, that a little while previously were seen on many a plain near the sea-coast, ascending like clouds or pillars of smoke, now sink down to the earth; the males die, or become, with many thousands of the troop, a prey to insect-devouring animals; but the surviving females, as if they were ashamed of their mad merry-makings, crawl away to some ant-hive of their own species. Whether it be the one in which they were born and brought up, or another, they now bear, in the hope of a new race which they bring with them, the insignia of a majesty and royal authority, revered by all beings of their kind, and received with loving homage; everywhere, in such a place, they are sure of a cordial reception and liberal support. But the tender, finely-woven wings, in the possession of which a little while before, the highest joy of life consisted, have now become, at the present stage in the little creatures' destination, instead of a delight, a burthen. The monitions of instinct teach her this, and by her own efforts and limbs she tears the brilliant ornament from her back, and creeps wingless among the class of unwinged workers, never again to leave them in the hive.

The beautiful fiction, not without meaning, that the pelican, in the ardour of its love for its young, in order to save them from death, tears open its own breast and feeds, and re-animates its fainting brood with its own blood, is indeed not to be taken to the letter; for the blood with which the white breast-feathers of this bird are sometimes seen to be sprinkled, when it is feeding its young with the fish which it brings in its pouch, comes from the wounded fish; or, if in rare cases, it is its own blood, from the slight wounds which the young pelicans make with their sharp beaks in the pouch of their parent, into which, while they are yet young, they reach as into a dish. But for the rest it is no fiction, for experience daily shows, that maternal

affection in the animal world is stronger than the necessities of the body and the pain of death. That it is not, so to say, a relationship of bodily elements, of flesh and blood, perhaps, which subsists between the mother and the young, born of her, but the impulse, the instinct of a love, coming from another and higher source, which gives its force to maternal affection, we are taught by the tenderness of animals towards those helpless little ones which a higher, a divine Providence has committed to their charge. Between the wagtail and the poor little motherless cuckoo, which came in the egg into her nest and under her wings, there is no flesh and blood relationship; nevertheless the tender foster-mother wears herself almost to death in seeking to satisfy her hungry foster-child. A celebrated naturalist, (Bechstein) once saw, in the autumn, when it was so late in the season that there was frost and even ice at nights, a wagtail at a sunny brook, running and flying to and fro with great diligence. Whoever knows how irresistibly the migratory impulse seizes this bird, when the time is come when all its tribe departs, and when, at the approach of winter, its food begins to fail, he will perceive that there was something unusual in the prolonged tarry with us, of a bird that lives upon insects, far into October, when in the open air scarcely a solitary fly is to be seen. Accordingly, it appeared singular to the above-mentioned observer, and he followed the little animal as it bore away an insect in its beak, as if it were foraging for its young. He saw, from the opening in a hollow tree, the head of a tolerably large bird extended eagerly to seize the food which its foster-parent brought. It was a young cuckoo, whose real mother had by some means deposited its egg in the wagtail's nest in the tree. The young bird had grown, had become completely fledged on the head and neck, but at the same time had become a prisoner, for the opening was too small to let his body through. But the tender foster-mother would rather have died with her nursing than forsaken it in its need.

What maternal care and fidelity can exceed that which the working classes of bees and ants show towards the eggs and the young of their queens? what patience of a human instructor can exceed that which the female turkey exercises towards

the chickens of a strange family, which she has been made to hatch? In the great Nursery of Nature, those creatures are not to be pitied, which, in our eyes, seem the most helpless and forsaken, for it is precisely these which are cared for the most generously and tenderly.

In a quite otherwise remarkable form does instinct appear, as the impulse and instrument of an all-upholding Providence, when the object sought is not the welfare of individuals or families, but the well-being of living creatures collectively. The force, which then moves the animal world, stands in so opposite and contradictory a relation to the instinct of self-preservation, that it often leads myriads of individuals, for the welfare of a whole country, to their own sure destruction. All the powers of man, and of those animals which come to the aid of man, in keeping down the multiplication of the white cabbage-butterfly, so destructive to our vegetable gardens, are often insufficient; if the increase went on without interruption, our cabbage crop would be utterly annihilated. For this mischief, however, Nature has her powerful remedies. Whole clouds of those butterflies, which produce this destructive caterpillar, may be seen quitting, all at once, the region of which they were the plague, and taking a course which, for the most part, terminates in the ocean. Such a caravan, giving itself to the fishes for food, continued, according to the observations of Lindley, several days, and kept its direction unchanged toward the sea. Kalm saw butterflies of this description over the waters of the British Channel. The swarms of locusts, when their number have grown formidable, take at last their way towards the sea or the desert, and the same has been remarked of other kinds of injurious insects. The lemmings, too, the field-mice of the high north, when they have become too numerous for their home, collect in immense flocks and move in a straight line, often towards an arm of the sea or to rivers, in which they find their grave. Even in the most favourable circumstances, only a very small portion of these emigrants return home. As a living body, in the growth of its limbs, sets, by its own inward power, certain limits to itself, so is this done also by the animated whole, by means of the force of instinct, inspiring its members. The water

of a fountain rises, through the pressure of a higher column of water, to a certain point, but when the agency of this pressure ceases, it tumbles ceaselessly down to the ground.

The force, which as instinct connects individuals in relations of mutual service, and with them, tends to the weal of the whole, not only controls the individual parts of the external world, but shows itself active also in the interior of every animated body, fashioning every element and organ of the same to the collective purpose of its life. As every part serves all other parts, so all at last help the activity of the animating soul.

The same thing which instinct achieves in obvious ways in regard to beings of external nature, is accomplished by the forming principle in its more hidden and inner circle. The bird must build a nest for the eggs which she is to hatch; a nest, the more carefully made, the more tender the situation of the young is, who come forth from her eggs. As the young of the singing bird come blind and unfledged into the world, the old birds must obtain for them such nourishment as is best adapted to their first stage of life, and in this case, a remarkable delicacy of instinct develops itself in birds fed from the beak, as the food which the parent birds bring to their new-born young is different from that which they provide several days after, and this again differs from that which they procure for them at a more advanced period. All these obvious expressions of a building instinct, and the instinct of maternal love disappear in the case of the quadrupeds; an animal of this class needs not the arrangement of a nest for the hatching of eggs, for its young become ready for birth, not without, but within its own body; it requires no instinct to lead it to seek their first nourishment for its young, for that nourishment without its own outwardly visible aid is prepared, as mother's milk, in the vessels of its own body.

(To be continued.)

GOOD BREEDING is a guard upon the tongue: the misfortune is, that we put it on and off with our fine clothes and visiting faces, and do not wear it where it is most wanted—at home!

FAMILIAR CONVERSATIONS ON INTERESTING SUBJECTS.

"MOTHER, will you give me some information about the comets, or stars?"

"Yes, Clara; but you must not expect to receive as full and particular descriptions of these bodies as of the planets."

"The stars, I think, mother, are stationary; but do the comets revolve around the sun as the planets do?"

"They revolve around the sun, Clara; but their orbits instead of being circular, or nearly so, as the orbits of the planets are, are exceedingly elongated or elliptical."

"Elliptical, I think, means something like an egg in shape, does it not, mother?"

"Something like it; but even that does not convey an exact illustration. An egg is oval, correctly speaking; still, I think you understand what the word means. However, you can form a more correct idea of what the orbit of a comet is, when I tell you, that sometimes they approach so near the sun, as to be within the orbit of Mercury, and then again recede so far from it, as to be far beyond the known boundary of the solar system."

"Do they always appear to move in the same direction, mother?"

"No; they appear in every region of the heavens, and move in every possible direction."

"Do they appear at regular periods of time, mother?"

"There are only three whose periods of return among us are known with any degree of certainty, and these are at such distant intervals, that they may be regarded only as the occasional visits of a stranger."

"How many years are there between their visits, mother?"

"The first has a period of 75 years; the second 129; the third 575."

"Then, mother, it is not probable that one person could ever see the same comets at two different visits."

"None, without it is the first of these, and that would scarcely be within his recollection."

"How many are supposed to belong to our system, mother?"

"About 500. Of this number, the orbits

of only 96 have been calculated; and, as I said before, the periodical returns of three only are known with any certainty?"

"What are comets like in their appearance, mother? Did you ever see one?"

"No; I never did. They are described as having no visible disc, but shining with a faint, glimmering light, and accompanied by a train or tail of immense length?"

"Then they are altogether different from the planets in their appearance?"

"O yes! they derive their name from the fancied resemblance their tail bears to the human hair; *coma* being the Greek word for hair."

"Are they opaque or luminous bodies, mother?"

"Opaque; their light being only the reflected light of the sun."

"Are they solid, too, like the planets?"

"It is supposed they are not; they are thought to be something more of the nature of fog or clouds."

"What is this supposition founded on, mother?"

"On the fact, that when these bodies approach near the planets, no sensible effect is produced on their motions, which would undoubtedly be the case if such immense bodies were solid. The train, too, is generally so transparent, that fixed stars can be seen through it."

"Have they ever approached very near to the planets, mother?"

"One which appeared in the year 1456 came so near the earth, that the moon was eclipsed by it, and yet the motion of the earth was in nowise affected by it. Again, in 1472 and 1763, they also approached very near the earth, and yet produced no sensible effect upon it."

"It is a wonder these strange visitants did not create considerable excitement and alarm among the people of that day."

"So they did. They were considered as being sent by the Almighty, as signs of plagues, pestilences, &c., with which he was about to scourge mankind in punishment for their sins; and it was not until considerable advancement was made in the science of astronomy, that they could be viewed without fear in the expectation of some dreadful calamity."

"Oh! mother, how miserable the people must have felt in those days!"

"I think so, too, Clara. The comet of

1456, on account of its great size, and near approach to our earth, filled all Europe with consternation. The success of the Turks had already terrified the people to a great degree, and Pope Callixtus then ordered a prayer, including the comet and the Turks in the same anathema."

"What is an anathema, mother?"

"A malediction, a curse."

"Was this the largest comet that has been seen, mother?"

"No; the comet of 1680, I believe, is the largest. This one excited as much interest among astronomers, as the one of 1456 did terror among the people. According to Sir Isaac Newton, this comet, when nearest the sun, moved at the rate of 680,000 miles an hour, but according to calculations made since then, it is 1,000,240 miles an hour."

"Why, mother, that was much faster than even Mercury; but how far was it from the sun, at its nearest approach?"

"Only 50,000 miles, while its greatest distance was 11,200,000,000 of miles. Its tail was supposed to be at least 100,000,000 of miles in length!"

"Oh! mother, how I should love to see this comet. Is it known when it will appear again?"

"Not in your life-time, Clara. This is the one whose periodical return is 575 years. Its next appearance, therefore, will be in the year 2225."

"Don't you think the heat of this comet must have been very great when nearest the sun, mother?"

"Yes, I should suppose it was. Sir Isaac Newton calculates that it was 2,000 times greater than red-hot iron. He further supposes that if it was the size of the earth, and had the property of cooling one hundred times faster than red-hot iron, it would take five hundred years for it to lose the heat it had acquired from the sun."

"Have no comets appeared since that one, mother?"

"Yes, there was one in 1807, which was ascertained to be nearly 540 miles in diameter, and the tail upwards of 9,000,000 of miles in length."

"That was small, mother, compared with the one of 1680."

"Yes, quite small; but the one which appeared four years after, in the year 1811, was calculated to be as large as the moon,

while its tail was full 33,000,000 of miles long."

"That was still a good deal smaller than the other, mother."

"So it was; but still it was as large, if not larger, than most of those which have been observed."

"What is it supposed causes these immense trains, mother?"

"A variety of opinions have been advanced by astronomers concerning them. Newton supposed they were thin vapour which the sun's heat caused to ascend in the same manner that smoke ascends from the earth. Kepler maintained it was the atmosphere of the comet, driven back by the sun's rays. Others, again, suppose it is streams of electric matter passing away from the comet. But the whole of this is conjecture. I did not expect, Clara, that we should spend the whole of our time this morning with the comets; but it appears we have, so we will leave the fixed stars for another day."



PLAYING TRUANT.—We never knew a boy who was in the habit of playing truant and wasting the golden hours of youth, to become a great and distinguished man. Most often the idler of early life is the laggard in the world's race. Truly happy is the boy whom parental or friendly care saves from this alluring danger of youthful days.

"The reason why truancy is so serious an evil, is not the loss of a day or two at school now and then, or any other immediate and direct consequence of it. It is because it is the beginning of a long course of sin; it leads to bad company, and to deception, and to vicious habits; it stops the progress of preparation for the duties of life, and hardens the heart, and opens the door for every temptation and sin, which, if not closed, must bring the poor victim to ruin. These are what constitute its dangers."

These words, written by a learned and good man, it would be wise for every child to ponder well. The fairest day would not then entice them, the merriest companion could not persuade them, nor the hardest lesson they might have to learn, affright them from this path of duty.

EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE SEVENTEENTH.

JERUSALEM, ITS PECULIAR ASSOCIATIONS—DESERTION OF THE STREETS—HOUSES—POPULATION—THE JEWS; THE MOHAMMEDANS; THE CHRISTIANS; AND PARTIAL RESIDENTS—GLORY OF JERUSALEM HAS DEPARTED—LATIN CONVENT—TOWER OF HIPPICUS, OR CASTLE OF DAVID—ARMENIAN CONVENT—GATE OF ZION—MOUNT ZION, AND TOMB OF DAVID.

"But to Mount Zion we are come,
The city of the living God."

MONTGOMERY.

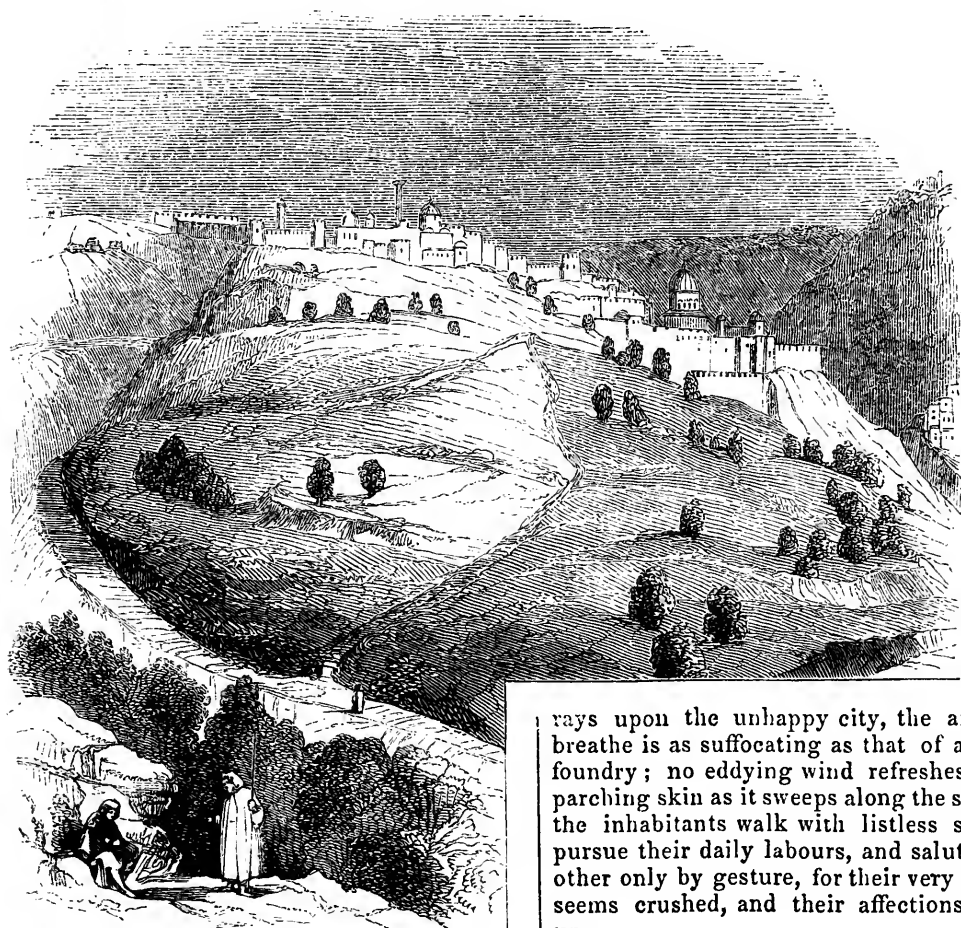
"Now shall thy house be desolate,
Thy glory now shall close;
Nor leave one trace of ruined state,
To tell where Salem rose."

DALE.

A RESIDENCE in Jerusalem has something very peculiar in its associations—it is so different from other cities, so motionless, so gloomy and dispiriting, so silent and forsaken, that it appears more like a city of the dead than one having such a vast population.

Every spot has its tale—each rock its tradition. This pool, or that tomb, are both rendered memorable by some historical event, and the very trees share in the veneration with which everything connected with the Holy City is held.

If you want amusement, it is not to be found—unless a little more bustle than usual in the bazaars, which are generally crowded, will satisfy you. Perhaps a ramble to Bethlehem, or a lounge in the cafés, may please you; but, despite all your endeavours, there is no possibility of being amused in the city. When any travellers arrive, they are weary, and seem to partake of the spirit of the place, so that you are obliged to retreat to your hotel, and dream away the hours of evening amid clouds of tobacco-smoke and dismal domestics. If you rise from your divan, and take a turn upon the roof of the house, you have not grand mountains to gaze upon, such as Gaspar Poussin loved to paint, or glorious sunsets, with the golden vistas of Claude, that are to be seen elsewhere—as on the coast of Syria, or even Palestine. There are no Ostade-looking



interiors, or Teniers-like hovels, to gaze upon in this city. Pleasing recollections of the paintings of Rembrandt, Murillo, Guido, Leonardi da Vinci, Michael Angelo, and Raffaele, come crowding into the mind, associated with the poetical effusions of Heber, Tasso, Dale, Milman, Montgomery, Roscoe and Knox, and as your eyes wander from dome to minaret, and from vale to mount, and from ruined wall to stunted tree, the Queen of Night casts her placid light on yon rugged hills and castled steep, and

"All height, depth, wildness, grandeur, gloom below,
Touched by thy smile, lone moon! in one wild splendour glow."

The morning mists are fast scattered by the fierce sun that pours his scorching

rays upon the unhappy city, the air you breathe is as suffocating as that of an iron foundry; no eddying wind refreshes your parching skin as it sweeps along the streets; the inhabitants walk with listless step to pursue their daily labours, and salute each other only by gesture, for their very nature seems crushed, and their affections dried up.

If we enter the streets they are narrow, wretched, frequently unpaved, and almost deserted.

"Alas, Jerusalem! each spacious street,
Was once so filled, the numerous throng
Was forced to jostle as they pass'd along,
And thousands did with thousands meet."

The houses are dirty, irregularly built square masses, some with domes, and some with flat roofs, and the shops are gloomy looking squalid places, where ugly and ferocious looking men smoke away the tedious hours. Silence reigns almost supreme, unless it be during the time the city is inundated by pilgrims.

The population of Jerusalem is very fluctuating, owing to the presence of pilgrims at certain periods of the year, and travellers who only remain a short time, hundreds arriving and departing in a day.

The estimate given by various authors exhibits a wide difference. Thus, we find that it is calculated by Wilde to be 30,000; by Turner, 26,000; by Salzbacher, 25,000; Richardson and Joliffe, 20,000; Scholz and Mr. Robinson, 18,000; Jowett, 15,000; Warburton, 12,000; Dr. Robinson, 11,500; and Buckingham, 10,000. My own impression is that it is about 12,000, as a resident population.

If it is asked how such accounts vary, I would merely remark that it is because there are not any official documents accessible to travellers; that the required information must be obtained from residents who may or may not be inclined to exaggerate; that the casual population is liable to large additions at certain seasons; that epidemics have reduced the numbers at other periods; that the informants themselves are frequently prejudiced; and finally, that some have included the garrison and foreigners. Mr. Wilde's information was obtained from the Latins and Jewish rabbis; Dr. Richardson's from a Turk; Mr. Joliffe's from a Christian; and Mr. Buckingham's from a Jew.

It is better to consider the population as two classes; 1. The residents; and 2. The partial residents, or foreigners.

The resident population consists of—1. Jews; 2. Mohammedans; and 3. Christians. The last class is again subdivided into Greeks, Latins, and Armenians.

The Jews have been variously estimated from 3,000 to 10,000. Dr. Richardson gives their supposed numbers as 10,000; Wilde, 8,000; Mr. Nicolayson, 6,000 or 7,000; Mr. Young, late British consul at Jerusalem, 5,000 or 6,000; Lord Nugent, 4,000; Joliffe, 3,000 to 4,000; Warburton 3,500; and Dr. Robinson 3,000. It is well known by those who have taken any trouble about the matter, that the Jews do not like to give their true numbers, which may arise from a Turkish law forbidding more than 2,000 Jews to reside within the walls; and, therefore, as Mr. Nicolayson and Mr. Young have both had excellent opportunities of investigating the subject, we may fix the number at about 6,000.

The Mohammedans consist of Turks from Asia Minor; descendants of Turks by blood, but Arabians by birth; a mixed race of Turkish and Arabian blood; and pure Syrian Arabs. They are computed

by Joliffe at 13,000; Lord Nugent at 12,000; Wilde at 10,000; Dr. Richardson at 5,000; Dr. Robinson at 4,500; and Warburton at 4,000. My own opinion is that they average, in round numbers, about 5,000.

The Christians exhibit a very medley group of creeds, for we find Greeks amounting, according to Joliffe, to 2,000, while Dr. Robinson only makes their number 460; Latins, estimated by Joliffe at 800, and Dr. Robinson at 260; and Armenians reckoned by Joliffe at 400, and Dr. Robinson at 130. To these we may add Copts, Abyssinians, Maronites, native Christian Arabs, Druses, Metawelis, and Syrian Christians.

The partial residents or foreigners, consist of people from nearly every country, and may be calculated, in round numbers, at from 4,000 to 9,000. The fluctuation of the partial residents is very considerable, on account of the great numbers of pilgrims that are annually shipped to Jaffa, and travel thence to the Holy City. It is affirmed that upwards of 30,000 pilgrims visit Jerusalem every Easter.

The glory of Jerusalem has, indeed, departed; for when Titus besieged the city, the number of the Jews was 1,300,000, and the Arabians state that the population of the city when attacked and taken A.D. 1099, exceeded 200,000.

"Alas, Jerusalem! alas! where's now
Thy pristine glory, thy unmatched renown,
To which the heathen monarchies did bow?"

She is "as a city which is compact together," even now, but yet not a vestige is to be seen of the Jerusalem of David or of Solomon; the course of the walls has been changed, and little remains but the valleys, the hills, and the pools to identify its original site with the present one. But still, as we wander amid its ruined edifices, or gaze from the Mount of Olives upon its embattled walls and towering minarets, we feel that this is the spot where David's harp sounded; where our Saviour bore the cross upon which he atoned for our sins; where Israel went up to worship; where Solomon erected his brazen platform, and the glory of the Lord shone in his temple. Oh! let not the sceptic place his foot upon thy hallowed soil! and let not the remembrance of the associations connected with thee be blotted from my memory! for "I

was glad when they said unto me, Let us go into the house of the Lord; our feet shall stand within thy gates, O Jerusalem."

The next place we visited was the Latin convent of St. Salvador, in the north-west corner of the city, on the edge of what is said to be Mount Gihon. There is not anything peculiar in this convent, except that it is the place where the pilgrims obtain a certificate of having visited the Holy City; and, perhaps, its irregular form girded by strong walls. From this we passed on to the city castle, which is built on the ruins of the *Turris Psephina* of old Jerusalem, and is now called the Castle of David, and sometimes the Tower of Hippicus. It is situated near the vale of Gihon, which it overhangs, and tradition affirms that it is one of the three towers built by Herod, and spared by Titus when the temple and city were destroyed. The lower part of one of the towers is evidently very ancient, and composed of large stones bevelled at the edges. The guide pointed to a spot north of the tower, which, he remarked, was the site of the house of Uriah; and near to it is what is now called "Bethsheba's Bath," a broken tank amid a heap of loose stones and weeds.

Passing on towards the south we reached the Armenian Convent of St. James, which stands upon Mount Zion, immediately within the city walls. It is, certainly, a fine convent, and so spacious that it is said the priests frequently lodge nearly 800 pilgrims at a time; attached to it is a large garden with a high wall. The church, which is the best attended, is the largest and richest of the Christian churches, and is said to have been built by the Empress Helena, on the spot where St. James the elder was beheaded. It was a strange sight to behold the priests scattered about the church engaged in devotional exercises—some in their dark blue dresses, and others in their sumptuous robes, mingled with pilgrims of all ages and complexions, and foreigners with quaint costumes; all forming a strong contrast to the beautiful mosaic pavement, which here and there was left uncovered by the carpet thrown over it, to preserve it from injury, and the pulpit in the centre of the church, with a cupola over it, both inlaid with mother of pearl and tortoise-shell; while the pillars, which are covered with porcelain tiles with blue

crosses and other designs on them, up to a certain height, and the altars covered with rich embroidery and church vessels, filled up the back ground. On the left, in a small recess, is what the priests term the sanctuary of St. James, sculptured in white marble, and adorned with painting and gilding; this is said to be the precise spot on which he was beheaded. Passing on, we came to the vestibule, where we were shown two large stones; it is said that one of them was taken from that part of the river Jordan where our Saviour stood when St. John baptised him; and that the other is part of the rock against which Moses broke the tables of the law at Mount Sinai!

Near to the convent is a small Armenian chapel, which is stated to be built on the spot where the house of the High Priest Annas formerly stood. Leaving this, we passed the lazar-houses on the left, where the lepers reside apart from the rest of the population, and went out of the Zion gate, which is the southern gate of the city, and leads to the summit of that part of Mount Zion which is without the walls.

Near to the Zion gate is an Armenian chapel, very ill-shaped and remarkably gloomy in its appearance, which is built upon the site of the palace of Caiaphas, the High Priest; within it is an altar enclosing a block of compact limestone, about seven feet long, three broad, and a foot thick, which is exposed in some places for the devout pilgrims to kiss it. This is affirmed to be the stone which closed the mouth of the sepulchre of our Saviour!

A few paces to the right of this chapel is the Christian burying-place, with its flat tombstones marking the last resting-place of many a Greek and Latin; but the most interesting one is that of Mr. Costigan, an Irishman, who, full of hope and the love of adventure, left his own land in 1835, to explore the whole of the Dead Sea, by sailing on its waters; but, alas! he fell a victim to fever.

A short distance from the cemetery is the place where the Virgin Mary expired, and that pillar on the north side of the gate of Zion, or David, as it is sometimes called, is the spot where the cock stood and crowed when Peter denied his master!

We are now fairly upon Mount Zion, one of the four hills upon which Jerusalem

formerly stood; viz., Mount Zion, on the south-east; Mount Moriah, on the south-west; Acra, on the north-west; and Bezetha, on the north-east of the present city. Zion, which was the highest, was formerly occupied by the upper city, "the City of David;" here was the residence of the ark, the palace of the kings of Judah; here our Saviour celebrated his last passover, and here the disciples assembled on the day of Pentecost. Desolate as Zion now is, deprived of her bulwarks of former days, and "ploughed as a field," yet it is doubly interesting for that very desolation, because, as we walk about Zion, and go round about her, "tell the towers thereof," and gaze upon the valleys below, we feel that the words of prophecy are fulfilled, for where her palaces once stood barley now waves, and the goats now browse on the scanty herbage on its terraced and sloping ridges. At its feet, about 150 feet below us, is the Valley of Hinnom, called Wady Jehennam, a narrow, steep, and rocky place, where the Jews sacrificed to Baal and Moloch, causing their sons and their daughters to pass through the fire; and before us is the Hill of Evil Counsel.

A gloomy mosque, said to cover the site of the Tomb of David, stands upon the summit of Zion, and as the last resting-place of the "man according to God's own heart," it is highly interesting, because it also bears some probability of truth with respect to its site," as we know that "David slept with his fathers, and was buried in the city of David;" and, moreover, St. Peter says (Acts ii. 29), that "his sepulchre is with us unto this day."

Part of the building was formerly called the Church of the Coenaculum, where our Saviour celebrated his Holy Supper with his Apostles, washed their feet, and instituted the Holy Sacrament. The guide pointed out a window in the upper part of the building, which he said belonged to the room where this event took place!

From this spot the Apostles departed "without purse and without scrip," to teach the religion of our blessed Saviour.



WANT of prudence is too frequently the want of virtue; nor is there on earth a more powerful advocate for vice than poverty.

DIFFERENT FORMS OF SLANDER.

SLANDER is the enemy of all goodness; hence the virtuous and the good have, in all ages, been the peculiar objects of its venom. How shall this odious vice be described? What colours shall perfectly delineate its character? In the varied storehouse of the imagination it is almost impossible to find materials for this work. Language falls far short of doing justice to this neglected subject. Although this effort may prove a perfect failure, the writer's time will not be wholly lost if not more than one mind may be impressed with the immeasurable turpitude and malignity of this dreadful vice, and lead to a resolution to guard against it for ever.

Slander is the product of a wicked disposition and a corrupt heart; it is the offspring of a malicious, envious and jealous spirit. In a slanderer we find what we should scarcely expect to find in any person—the coincidence and concentration of all evil qualities. Such a compound of all the vices—such as pride, hypocrisy, treachery, and cruelty, needs some disguise to conceal its loathsomeness and deformity.

To whatever we may attribute this delusive desire for evil speaking, whether to natural cruelty of disposition and a love of mischief, or to an envious, jealous temper, impatient of the merit and superiority of others—whether to ambition or insatiate lust—to which of these causes we attribute this loathsome disease, true it is its growth and progress is as injurious as it is disgraceful to a civilised people. To pass an ill-natured reflection on a well-meant and innocent action; to condemn a person for a word spoken inadvertently or in jest; to rob an innocent man of his character, and, above all, his peace, while a family is dependent on his labours for bread, and all this out of pure caprice and wantonness—ay, and sometimes from worse motives, is such a complication of wickedness, and such a perversion of the noble powers of mind, as cannot fail to excite the deepest disgust and incur the heaviest censure.

Numerous are the means employed to prepare and circulate the poison of slander, and very frequently the infusion is so subtle and skilful that it can only be discovered by its effects. There are many

private and secret ways of wounding another's reputation, as well as those which are more open and public. To but a casual observer the workings of the passions are plainly discernible in the human countenance; the thoughts and feelings are as strongly imprinted there as though written with a pen or expressed by the tongue. Slander lurks in every feature, and speaks in every expression. Sometimes when perfect silence prevails, the countenance is telling tales, and hinting at imperfections, and emblazoning crimes. It is very sad to think that a slur has been put upon the purest character and the best motives, by a look which none could fail to interpret. Serious doubts have been entertained respecting the honesty and integrity of such as are above reproach, by a knowing wink of the eye, or a peculiar movement of the head.

Who can give any account of the injury which has been done by an adroit twirl of the fingers or a mysterious whisper! Even an expression of astonishment—a question proposed with a certain air and manner, a solemn Oh! or Oh dear! or I know as much as I want to know about such and such a one, or a heavy sigh, or a hysteric laugh, each have in their turn done incalculable mischief, awakened a thousand suspicions, weakened confidence, and kindled the flames of prejudice.

The solemn tones and measured words of some Dolly Meek or some Peter Pure have produced the settled conviction that there was some mischief brewing, or that something very dreadful is about to happen to such and such a one as a reward for their past conduct. The mysterious looks and simpering insinuations of some more than wretched gossip—the spasmodic fits of horror—the sideway looks into which the righteous sometimes fall, are also attended with the most chilling effect.

Thus does it lie in ambush, silently diffusing its venom, and results in the ruin of thousands. Who can readily detect the formidable evils which lie in ambush? But what are some of the different forms of slander? There is one species in the form of WHISPERING. This consists of speaking of a person's failings in private. This is done in a very confidential manner to some particular and intimate friend, and generally has an introduction something

like this: "Now I am going to tell you something, but *don't mention it* to any one." Thus the story creeps along and spreads through a community, until the public mind is irremediably tainted. BACKBITING comes next. Undoubtedly more have suffered in their reputation by backbiting than by public accusations. Against the former we may arm ourselves; but being ignorant of the designs of the backbiter, we are taken unawares. TALE-BEARING is another species; these are generally the accommodating carriers of news for the special gratification and relief of the curious. These three generally are the most odious and mischievous characters in a community, and they should be abhorred and spurned as a walking pestilence. DETRACTION is also another; this consists in robbing persons of the praise to which they are justly entitled. FLATTERY is another, but none the less detestable. A flatterer represents persons and things otherwise than they really are, and thus hurts the credit of an individual by an unworthy excess of praise, as much as detraction diminishes it by withholding what is due, besides creating disgust in any sensible mind. Avoid the oily tongue of a flatterer. Such are a few of the common and odious forms of Slander. It would require a large volume to delineate fully this dreadful sin. Almost every other vice meets its just deserts; but this common and dreadful monster, Slander, is suffered in too many instances to go undetected and unpunished.

FORCE OF HABIT.—A story is related in Cunningham's *Life of Sir Joshua Reynolds*, which shows how ridiculous a great man may be rendered by the force of habit. He had been taught by his old master, Hudson, to paint portraits in a certain position, the gentleman holding his hat under his arm. Before he had thrown off the trammels of habit and began to exhibit that free and bold manner that afterwards distinguished him, a certain customer desired to be painted with his hat on. His wish was gratified, but when the portrait was sent home, the gentleman's wife was not a little astonished to perceive that her husband had two hats, one on his head and another under his arm!

REVELATION AND SCIENCE.

BY THE REV. G. R. CROOKS.

UNDER the title *Revelation and Science* we propose to inquire how far some of the physical discoveries of the present age harmonise with the teachings of Scripture. In a field so ample, it is possible to select only a few points out of a great number. The earnestness with which the study of nature has been prosecuted since the days of Bacon, has so enlarged the domain of this department of knowledge, that its subdivisions have become sciences, each one of which is sufficient to occupy the whole of a studious life. It would not become us, therefore, to assume to do more than to test some of the results reached in this sphere of intellectual activity, admitting, while we do so, that so far as these results have received the general assent of scientific men, they are correct. We do not limit ourselves, in using the term *Revelation*, to the truths which are peculiar to the Bible, as distinguished from those of natural religion. We shall draw at pleasure from the whole body of religious truth, without special regard to the source from which it may be said to be originally derived. As this distinction between natural and revealed religion is one current only among the learned, it may be, with propriety, laid aside in popular exposition.

It is the lot of that record of truth which we call our Bible, to be subjected to every possible species of test and severe scrutiny. Standing as a light-house, far out on some rocky ledge of the deep, it must bear every buffet of the wind-chased billows, and sometimes be immersed in the spray which sweeps over its head; and when the storm is lulled, and the waves have fallen, we look with anxiety to know if it still is there, to cheer with its enlivening lamp, and to guide the wanderer home. Every new fact, every new opinion, every new hypothesis, just struck from the speculating brain, must be brought into collision with Scripture, that it may be seen whether they tally with one another. At the incoming of every new intellectual movement, the Divine testimonies must again go into the crucible, only, however, to come out as gold seven times tried. The accretions of human comment may

be burned to dust, but God's word abides for ever. Old revelation and new-born science are daily brought to face one another; and if, for a moment, they may meet as antagonists, yet, as they are both organs and voices of one and the same God, they must ultimately understand each other's speech, and bear the same testimony of Him from whom they come.

There are in this connexion two false tendencies which are alike to be deprecated. On the one hand, an undue suspicion may be entertained of science, and her progressive discoveries; and on the other, there may be an undue disposition to seize hold of every scientific theory which can be brought to bear against revelation. At times, the lovers of the Bible may be excessively timorous, and, at times, the votaries of science may be excessively presumptuous. But God's truth, whether coming to us through his word or his works, must always be consistent with itself. The guide-book to immortality cannot conflict with the field-book of Providence. Having different ends, they may look at the same object from different points of view, treat of it under different relations, yet it will never so disagree that both cannot be credited. Their ends are certainly unlike; the topic which the one casually touches, the other laboriously investigates. Science unfolds for us God's wisdom—*Revelation* his holiness. Science explores the divine scheme of creation—*Revelation* the scheme of restoration. Science bids us study the plan, the proportions, the beauty, the foundations, the pillars, the beams of this great universe-temple, and admire the "brave o'erhanging firmament, the majestic roof, fretted with golden fire"—*Revelation* invites us within, to the holiest place, where we may bow before the manifested God.

It must be remembered, too, that if *Revelation* has had its foolish interpretations, *Science* has had its puerilities. The world has laughed at the church for refusing to admit the Copernican theory of the solar system; and for persisting in the opinion that the earth is the centre of the visible universe. But this was in the days—

"When mother church did mightily prevail,
And parcel'd out the Bible by retail;
But still expounded what she sold or gave,
To keep it in her power to kill or save."

It has not been so very long since Buffon conjectured that our solar system was produced by the falling of a comet into the sun; and that the blocks and fragments consequent upon this collision have been rolled into the planets which now revolve with the earth around a common centre. Another theorist is said to have supposed that the deluge was produced by the immersion of the earth in a comet's tail. Indeed the time was, when comets were great helps to lame, halting theories. If a sphere was to be broken into pieces, a comet was the hammer; if the world was to be burned up, a comet was to carry the fire-brand, in the same manner as Samson's foxes, in the fields of the Philistines; if a deluge was to be accounted for, a comet became the convenient reservoir from which the floods were poured forth. We do not go too far when we say, that all theories of the universe, which are not strict inductions from facts, will ultimately appear absurd or ridiculous: it will be found that a cloud has been mistaken for Juno. The theologians with their interpretations, and the savans with their theories, live alike in glass houses; and both must be careful how they throw stones.

Let us, then, look at some of the points upon which Revelation and Science are supposed to disagree, and ascertain whether their testimonies cannot be reconciled.

1. They are, by some, considered not to be harmonious upon the question of the age of the earth.

The all-investigating mind of man has proved that the finding "of sermons in stones, and God in everything," is not a poetic fiction: As human skill has at last triumphantly deciphered the obscure hieroglyphics of Egypt, so has it learned to read the marks and signs of the more ancient pyramids of creation. Science now assumes, that the rocks of the earth are the monuments of its past history, erected by the Creator to show the pathway he has trodden, in the manifestation of his power and greatness. They are the stepping-stones by which he has been pleased to advance to the full consummation of his wisdom and his art, in the present constitution of the world. How then does Science read these relics of our globe's far distant past?

(1.) It asserts that the rocks of the earth appear to have taken their present form

from the operation of second causes, the chief of which are fire and water.

(2.) That the stratified rocks, *i.e.* those which are found piled in layers one above the other, have been produced by the action of water. The rocks previously existing must therefore have been worn by this agency into mud, sand, and gravel, and afterwards hardened into the layers now existing, by the action of heat, or some other chemical agent. These strata are estimated to be ten miles thick. In consequence of the upheaval of the earth's crust, in many places, the layers are presented somewhat in the position of a much inclined flight of stairs, so that what is in reality depth, may be measured as extension on the surface. At the present period of the world, these formations do not go on faster than at the rate of a few inches in a century.

(3.) To the depth of six and a half miles, the strata contain the fossil remains of plants and animals. They are the remains of plants and animals, differing, with few exceptions, from the species now existing. Nearly all of these species, numbering many thousands, had died before the present races of plants and animals were created. And still more, they are thought to have been distributed into four or five groups, each group passing nearly or entirely away, before its successor appeared.

These brief statements, gathered from various writers on Geology, present the substance of the discoveries which they affirm to have been made. If they be true, we must regard the rocks of the earth as God's museum, where the remains of the past are collected, and duly arranged; as catacombs of the myriad dead; as sarcophagi, where the former occupants of our globe, dynasty after dynasty, lie entombed.

But the remains of man are discoverable only in the "surface-soil," the alluvial deposit of one or two hundred feet, which a few thousand years have sufficed to accumulate. If, then, we regard the revealed account of creation as the history of man, and of the creatures associated with him, we are at liberty to consider the preceding states of the globe as a vast series of preparations, the fitting up of the home for its lord and occupant. Let us descend, and see what has been before us, and how the Ancient of Days, with whom a thousand

years are but as yesterday, busied himself before he uttered the decree, "let us, in our own image, make man."

Passing the alluvial deposits, we reach the tertiary bed, "composed chiefly of sand, and clay, and lime, and presenting a thickness of more than a thousand feet each. Time will now be measured for us, not by the revolutions of heavenly bodies, but by the dropping of the sands out of God's hour-glass, and their spreading and accumulation, sheet after sheet, layer upon layer, in dense, hardened masses. Already the known forms of animal life are disappearing, till at last, strange, but extinct species, everywhere predominate.

That these stratified rocks have been produced by the agency of water, appears to be evident from several considerations. The depositions from rivers, lakes, and seas, made since the time of man, have the same essential marks of stratification, wide surface, and comparative thinness. And as among the ancient rocks, we find strata of different chemical constituents in juxtaposition, "such as limestone succeeding clay or sandstone," so in modern depositions like successions appear. Many of the ancient rocks are ripple-marked, showing the action of tides.

Still descending, we reach the secondary formation, containing the chalk beds, the oolitic and new sandstone systems, each one apparently the growth of many ages, and several thousand feet in thickness. Here, we are in the region of monster reptiles—the so-called Saurian or lizard-like creatures. Next are the coal measures, the decayed remains of a former vegetable world. What a proof of forecast and benevolence is this storing up in Nature's cellars, long before we wanted it, the fuel wherewith to warm us, and the material for that light which almost turns night into day. How strongly it reminds us of the inspiring language—

"Thou madest man to have dominion over the works of thy hands;
Thou hast put all things under his feet."

Beneath the coal-beds are the limestone formations, abounding in fossils. Beyond this is the old red sandstone, so interestingly described in the recent work of Mr. Hugh Miller. At this point the traces of land plants and of reptiles have disappeared.

And yet, though we have descended so

far, we stand upon the threshold only of the primary formation. And travelling downward here, we reach before long the limits of organic existence, and enter "a region older than death, because older than life itself." Descending through the several thousand feet of the beds of mica, schist, and gneiss, our ladder touches at last the granitic foundation, on which all the strata rest. Here we are supposed to come to the rocks which have assumed their present shape from the action of fire.

This crust of the earth, through which we have passed in an imaginary journey, is assumed to have a depth of ten miles. And when we consider how slowly stratification goes on at the present day, how many years must elapse in the formation of rock of a few inches in depth, the mind is lost in the effort to conceive of the ages and cycles of ages which have elapsed since this stately pile began to be reared. We cannot but think of the solemn language of inspiration—"Of old hast thou laid the foundation of the earth, and the heavens are the work of thy hands. They shall perish, but thou shalt endure; as a vesture shalt thou change them, and they shall be changed: but thou art the same, and thy years shall have no end." "It is well," says Mr. Miller, "to be made to know that we ourselves are barren-minded, and that in Him all fulness dwelleth. Succeeding creations, each with its myriads of existences, do not exhaust Him. He never repeats himself. The curtain drops at His command over one scene of existence full of wisdom and beauty—it rises again, and all is glorious, wise, and beautiful as before, and all is new."

We have already indicated how these discoveries claimed as true by science, may be adjusted to the word of God; but let us look at the matter a little farther.

We must bear in mind that the object of the Bible is to teach us, not science, but moral truth. It uses the popular language, taken from appearance, and not the strict terms of scientific analysis. Hence in Scripture the sun rises and sets, and the stars revolve around the earth, though strictly speaking, the earth rotates and hides the sun from us, and again brings him into view. And we ourselves, though we have the scientific apprehension of the facts, yet adhere to the popular language. Newton

and Laplace, no doubt, used the same terms, when speaking colloquially of the phenomena of day and night, as the most ignorant peasant of their times. It may be questioned whether the inspired writers knew that the earth was a sphere; and if they did not, it makes nothing against their inspiration—for scientific truth is reached through certain logical processes of thought, and if these processes are not completed by the mind, it will not receive what claims to be thus true. Again, these truths are received by us in a certain order, and lie in the mind in a certain state of interdependence, and if God, when inspiring his servants, had turned aside at every natural fact, and had explained it, so as to make the apprehension of it scientifically exact, his servants would have been diverted from the true end of revelation. It is this attempting a detailed cosmogony which makes the sacred books of all the ancient nations, except the Hebrews, appear so absurd—for science being progressive, the hypotheses of an age long past seem childish to us; and so, perhaps, will some of ours to the cultivators of science a thousand years hence. It is not many hundred years since philosophy sought an elixir of life, and an agent capable of transmuting all the baser metals into gold. They wished to be rid of death. They wanted

“To keep the living from ever needing
Such an unnatural, strange proceeding,
By showing conclusively and clearly,
That death is a stupid blunder merely,
And not a necessity of our lives.”

And this great elixir was what? *Alcohol*. The search for the philosopher's stone did no immediate good, but led unintentionally to the modern science of Chemistry. Great names in science are but for a time, and soon go down. Locke is displaced by Kant, and Kant by Schelling and Fichte. The actual knowledge of nature, which Bacon could boast of, was but a, b, c, in comparison with the results now obtained by his disciples and followers. Had Scripture been linked with any theoretic system of nature, it must have been, of necessity, with that which shall be reached, when we shall see as we are seen, and know as we are known; otherwise it would have forfeited its character of expressing the immutable truth of God. Well does Lord

Bacon say—and he is never more judicious than when fixing the lines and limits of these two systems of truth—“To seek heaven and earth in the word of God, is to seek temporal things amongst eternal; and as to seek divinity in philosophy is to seek the living amongst the dead, so to seek philosophy in divinity is to seek the dead amongst the living; neither are the pots or lavers, whose place was in the outward part of the temple, to be sought in the holiest place of all, where the ark of the testimony was seated. And, again, the scope or purpose of the Spirit of God is not to express matters of nature in the Scripture otherwise than in passage, for application to man's capacity, and to matters moral or divine.” And to the same purpose is the summing up of the end of Scripture by the apostle John: “These things are written that you may believe that Jesus is the Christ, and that believing you may have life through his name.”

We have said that the Scripture is free from those absurdities, into which all other systems of cosmogony have fallen. Let us look at the ancient Pantheism of the Hindoos. According to it, the indeterminate being Brahm, after waking out of an eternal slumber, produced Brahma, the creator. Brahma is the all-existing; beside him, everything else is shadowy and phenomenal. Nothing is but Brahma. “He is like a mass of clay of which particular beings are the forms; the eternal spider, which spins from its own bosom the tissue of creation; an immense fire, from which creatures ray forth in myriads of sparks; the ocean of being, on whose surface appear and vanish the waves of existence; the foam of the waves, and the globules of the foam, which appear to be distinct from each other, but which are the ocean itself. Brahma is like an infinite man; the fire is his head, the sun and moon his eyes; he has for his ears the resounding vault of the heavens, his voice the revelation of the Vedas; the winds are his breath, the universal life his heart; the earth his feet.” We never read in our Bible that the moon is fifty thousand leagues higher than the sun; that the earth is triangular and composed of seven stories, one of honey, another of butter, another of sugar, another of wine; that the stars influence the destinies of men, an

absurdity pretended to be believed in this nineteenth century, wherewith some drive a lucrative business and enrich themselves with fools' pence. And when it is remembered that the early writers of Scripture lived several centuries before Homer, it must have been a Divine guidance that preserved them from such blunders. The Bible seems also, if not to foreshadow some scientific truth, at least to be adjusted to them when discovered. What does Job mean when he says—

“He spanned the heavens o'er empty space,
And hung the world upon nothing.”

Again, the physical heaven is termed an expanse, not a firmament, or solid substance, as the seventy render it. It is described in the terms which science would use, as the pure ether, through which creation rolls. And again we read—

“He bindeth up the water in his clouds,
And they rend not under it.”

True as to appearance, and to fact. But in all these, and other descriptions of the divine operative agency, the moral element predominates:—

“How slight is the whisper we hear of Him,
But the full thunder of His power, who hath ever
comprehended it?”

We only perceive the surface of His power :
its fulness we cannot understand.

(To be continued.)

STEAM ANTICIPATED.—“Bridges,” said Friar Bacon, “unsupported by arches, can be made to span the foaming current: man shall descend to the bottom of the ocean, safely breathing and treading with firm step on the golden sands never brightened by the light of day. Call but the secret powers of Sol and Luna (heat and cold, or hydrogen and oxygen?) into action, and behold a single steersman sitting at the helm, guiding the vessel which divides the waves with greater rapidity than if she had been filled with a crew of mariners toiling at the oars. And the loaded chariot, no longer encumbered by the panting steeds, darts on its course with relentless force and rapidity. Let the pure and simple elements do thy labour: bind the eternal elements, and yoke them to the same plough.”

OBSERVATIONS ON TEACHING DRAWING,

ESPECIALLY TO CHILDREN AND UN-
EDUCATED BEGINNERS.

WITH whatever view we educate a beginner, and however high may be his future destination, we may be assured that refined lines, exquisite forms, perfect *chiaroscuro*, and harmoniously blended colouring, are not the commencement of art, and the beginner will not profit by mocking these. The beggar's appearance is nowise improved by an array of silken tatters; nor does the child become a warrior by getting a sword of lath and a wooden gun.

If it be desirable to educate the young human being into the adult comprehensive artist, all his faculties must be exercised, and, as a general rule, together: he must not be a thing of threads and patches. However correct and beautiful these are, chance will not jumble them into a harmonious, natural whole, fitted to act (as all high art should) on the entire being of the competent observer. This union is the most difficult thing of all, even under the most favourable circumstances, and it is the highest of all; and by most who strive it is rarely attained. Does the French plan of devoting many years to the sole copying of the finest lines ever produced, and the most accurate shadows in neutral colour, create real artists? What they do belongs not to this world—it is lifeless, repulsive: while the delay of colour to a late period of a life previously spent on black chalk and grey paper, destroys all feeling for colour. The colouring of many of these artists is disagreeable, and frequently disgusting. If an eye for colour be not got early in life, it will probably never be attained.

So also of the higher mental faculties connected with art, especially the invention or imagination. If these be disregarded until late in life, mere imitators, mere clever machines are the usual results. No beings are so imaginative and inventive as young children, and why should their faculties be smothered in unfathomable strata or mathematical diagrams? In our zeal for the hand we must not forget the head.

Let the understanding go first, above all things, and rule the hand and eye. By inverting this order, and allowing the hand and eye to take precedence, and rule over the higher powers, good mechanical draughtsmanship may be attained, but the most valuable purposes of drawing are lost sight of.

More than one instance has been observed of children unusually slow and incorrect in imitative drawing, who have exhibited at least the average powers in exercises for the invention. Renewed exertion is likely to take the place of despondency on finding that they are not always below their fellows. Exclusive attention to single parts is apt to distort the mind by the very success attained in such partial operation. Hence many of the common mannerisms and tricks into which artists are so apt to settle down.

No one was ever a great artist who was not a great man: and yet we try to make great artists by preventing our pupils from becoming even little men. A human being is not an anatomical preparation, nor a thing of dry bones, be they bleached ever so whitely, nor a walking rule and compasses. It is a painful sight to witness youths set to copy from morning to night—their general education neglected, and even their art-faculties of the higher kind uncared for. The true artist is made of other stuff. Universal powers are wanted for this high future calling. Like the young of every other kind, he tries his powers in every way, in mimic action certainly, but they all act, and act together rather than apart: thus, in time, all attain adult proportions. He copies, not for the sake of copying, but to show him how he may be a better original. Of himself he does what he can, and then copies to find out how he can do better; but he never gives up working for himself. He makes lines, the best he can, and bad they are; in time he does better and better—for perfect lines betoken high art. He copies lines occasionally, and mathematical figures, not for their own sake, but because he has made such general advance as to feel his imperfections and to desire to remedy them. He wishes to learn all art, and not merely a few tricks of the hand; to imitate nature with refinement and feeling, not to make a staring likeness of petty details. Hence his work

is an endless variety of trials and experiments in all directions: outlines, shade, colour, composition perpetually recur from beginning to end, but not as things apart; and less as things in themselves than as the sensuous exponents of thought and emotion. Above all, he will not willingly do anything that he does not understand; not through the vain belief that he has arrived at perfection, and that there is not much that is true and good and great that he will never reach; or that there is not much hard work still before him to attain even a slender portion of these; but because he is assured that if he once lose his firm footing on the earth he will be tripped up and tossed about in the ocean of distraction and error.

The admirers of the abstract method contend that bad habits must be guarded against, and none but good habits permitted and enforced from the beginning of the youngest pupil's instruction. There appears to be a fallacy here. If good habits only are permitted, nothing can be learned or executed. The novice must inevitably begin with bad habits: if he did not, he would not be a beginner, and would not require to be taught. He begins with bad habits, and goes on slowly and progressively improving them, until at last he acquires good habits, or habits as nearly good as are compatible with his own capacity and his master's skill. If he and his instructor expect good habits at once in any one point, they will be grievously disappointed. And if the master thinks that effectual tuition is not a slow transit from what is bad, through what is less and less bad, to what is positively good, if he expects the distance to be cleared by a single leap, he will be no less disappointed.

If there be any truth in these views, it will follow that the highest and most refined stages of form, light and shadow, and colour, are unfit for the beginner because they are unintelligible and inimitable in his crude state; and that comparatively clumsy objects of imitation prepared to meet him half way are far preferable. The child can understand the form of an article in daily use and will have some chance of imitating it, when a recondite and an exquisitely-formed Greek vase would be quite out of the question; and he may

seize the points and character of one of George Morland's rude but natural and expressive husbandmen, though he would be bewildered before the Laocoon or the Apollo.—*The Builder*.

INDUSTRY.—HINTS TO YOUNG MEN.

"To the diligent labour bringeth blessing: The thought of duty sweeteneth toil, and travail is as pleasure; Labour is good for a man, bracing up his energies to conquest, And without it life is dull, the man perceiving himself useless." TUPPER.

FRANKLIN, when writing home from Europe to the American colonists, before the Revolution, told them they must "light up the *candles* of industry and economy." A homely figure, but, in truth, without the blended light of these two virtues, it would be difficult to find the "way to wealth."

Industry, say you, is a virtue to be sure, but not at all congenial with the hilarity and joyfulness of life's holiday period—youth and early manhood.

A modern French philosopher announces it as a grand discovery, that the whole science of happiness is comprehended in one single word—*occupation*.—No new discovery, this. The wisdom of ages is condensed into proverbs, and many there are which announce the same truth. "The idle man's head is the devil's workshop;" "the devil tempts every man, but the idle man tempts the devil himself;" "idleness is the mother of poverty;" "idleness clothes a man in rags." Crime, want, and misery, thus dog the way of the indolent.

But suppose you could "dig" gold enough in the course of a single month to enable you to "fare sumptuously every day," through a long life of idleness. The restlessness, the satiety, the *ennui* of such a life, would render you more unhappy than does the unremitted toil of the man who earns his daily bread in the sweat of his brow.

Pleasure is in the race, not at the goal alone. Success is the reward of exertion, yet we play the game of life (serious play!) as we do the game of chess—for conquest: the pleasure is in the contest, the strife, by which the victory is obtained.

Men woo Fortune, and the pleasure is in "the wooing on't—the wooing on't." The fruit that drops from the tree into the lap of the school-boy, is not half so sweet as that for which he climbs the topmost bough.

Regular, systematic industry has proved to many a young merchant not only a safeguard from temptations to vice, but the cheering friend who led the way to ultimate success.

William Gray, one of the most successful of American merchants, was remarkable for industry—indeed it was to him the cap of Fortunatus.

"Young Gray," says the biographer, "was an enterprising and indefatigable apprentice, and had acquired the *confidence* of the principal merchants in Salem, when he commenced business for himself, which, in that careful and industrious town, was a fine capital to begin upon.

"Mr. Gray was early prosperous in his affairs, and in less than twenty-five years after he commenced business, was considered and taxed as the wealthiest man in the place, where there were several of the largest fortunes that could be found in the United States. *For more than fifty years of his life he rose at the dawn of day*, and was shaved and dressed before the usual hour for others to rise. Being dressed, his letters and papers were spread before him, and every part of his correspondence brought up."

Industrious application to business should not prevent a young man from giving due attention to the general culture of the intellect. He has something else to do in the world besides scraping together heaps of wealth. The immortal mind is not, meantime, to be starved and grovelling. It is a poor, a mean ambition, to aim alone at the *possession* of millions, without the power of enjoying them induced by cultivating the taste, the mind, and the heart. Industry is as requisite for this purpose, as for that of accumulation.

Idlers! They are the pest of society. Would that our government would appoint public officers to take cognisance of all the loungers, and bring them to punishment, as did the Areopagus at Athens in the days of Solon. Those officers inquired after the ways and means of every man in the republic, and if the vagabonds whom

they spied out, could give no account of their mode of procuring a living, they were sentenced to condign punishment.

Solon wisely reasoned, that those men who used no lawful means for procuring a livelihood, must subsist by dishonest and unlawful means, and in time such a set of gamblers, speculators and knaves would spring up, as to corrupt, and eventually destroy a kingdom;—restless, dangerous, turbulent spirits, who would band together and break through the cobwebs of the law as readily as the rich and powerful.

And these “loungers,” forsooth, call themselves “gentlemen,” and make their boast that they have nothing to do—as if do-nothingness were the leading characteristic of a gentleman!

Well has a distinguished Christian moralist said: “The charter of our privileges is our national character; let this character fail in the great trial which it is passing through; let luxury and excess grow in our cities; let vice stalk abroad fearlessly in our villages; let our hardy yeomanry become indolent, inefficient, bankrupt in property, and more bankrupt in spirit; let our noble youths lose the principles of a virtuous education, and vie with each other in extravagance and revelling, and farewell to the dignity and the joy of freedom! Though the semblance remain awhile, the spirit will be fled for ever.”

PLANTAGENET.—The etymology of this name, which has been borne by the English sovereigns of the house of York, is derived from *planta genista*—that is, the plant *broom*—and is said to have originated in the following circumstance:—Fulke, Earl of Anjou, having been guilty of some crime, was enjoined, by way of penance, to go to the Holy Land, and submit to severe castigation. He was dressed in a lowly attire, and as a mark of humility wore in his cap a piece of broom, of which virtue this plant is a symbol, and is called by Virgil *humilis genista*—the humble broom. The expiation finished, Fulke, in remembrance, adopted the title of Plantagenist, and his descendants accordingly inherited the name; and many successive nobles of the house of Anjou not only did the same, but distinguished themselves by wearing a sprig of broom in their bonnets.

THE ADVANTAGES OF ARITHMETIC.

How much may be said in favour of any individual subject—and how often are the most useful things overlooked, merely because they are thought to be sufficiently obvious! Of all the sciences that engage the study of man, perhaps none is so essential or so valuable as Arithmetic, or the science of numbers. This is, indeed, sufficiently cultivated by those whose intended sphere of life is supposed to require an accurate and ready knowledge of its principles—but what is that situation in which it is not absolutely necessary to be acquainted with its practical uses?

It has been observed, and I believe with great truth, that no one was ever undone who kept an exact and regular account of his income and his expenditure. Unforeseen and unavoidable calamities may, indeed, surprise the most vigilant, and overset the most methodical; but few are the persons who fail in life from such imperious causes, compared to the vast numbers of those, who may date their misfortunes from negligence in adjusting their accounts; and who are ruined before they perceive that they are in danger.

Let me, therefore, recommend it to you, my dear readers, as you value peace of mind, independence, and fortune, to acquire an early facility in numbers, and a fixed habit of rendering them subservient to those purposes which will secure you from the imposition of the cunning, and from the delusion of spending more than your circumstances will allow.

Whatever your income may be, apportion it; with scrupulous exactitude, to your weekly, monthly, or yearly expenses. It is impossible, indeed, to live in society, according to one uniformly invariable tenor; but the extravagance of one day should be compensated by the economy of the next; and nothing short of absolute necessity should induce you to interfere with the general arrangements, which a prudent regard to your circumstances imposes.

It is almost impossible for any thinking person to run the heedless career of constant dissipation, who, by referring to his pocket-book, should his rank require no other books to be kept, sees on one side

of a weekly page, his income or allowance, which he is to husband; and on the opposite, his disposal of it. Keeping such a statement is not only a guard against profusion; but also a security against imposition. Thus what has been once paid may be easily authenticated; and what has been foolishly spent may be remedied in future.

All the attention and the knowledge that this will require, is so trifling, that no persons but the most illiterate and the most indolent, can offer any excuse for neglect. Indolence, however, can be no excuse for any omission of duty to ourselves or to society; and the very lowest classes of mankind, whose misfortune it may be to be debarred from proper opportunities of improvement in learning, seldom acquire so much credit as will injure others, or have so much to waste, as can materially affect themselves. Yet there is no situation, not even the lowest, that will not find a comfort and a benefit in apportioning its pittance to its expenditure; and thus learning to find resources in honest industry, frugality, and prudence. It is chiefly, however, on those who are removed from real want, on those who are rich, or relatively so, that I wish to impress the observance of regular accounts. The father of a family, if he is negligent in this respect, is unworthy of the station he fills—the mistress of a house, who pays no regard to domestic expenditure, is entailing want on the children she caresses, and can never be the object of love or esteem.

The name of book-keeping, as this will be called, may possibly frighten the gay and the young. It may be supposed that it requires deep attention, and much previous knowledge; but on what does it hinge? on the four simple rules of arithmetic—ADDITION, SUBTRACTION, MULTIPLICATION, and DIVISION. The RULE OF THREE or PROPORTION is also of very considerable use; but it is only a particular application of the rules already enumerated; and its principles may be acquired with very little labour.

Can any one then be justified, when his credit begins to fail, and the clamours of those he has injured, assail him, by alleging that he did not know he had exceeded his income? Should even want stare him in his face, where is his apology? He must, on reflection, be sensible how easily he might

have known what was his interest and his duty to know; and if he has failed through inattention, he neither deserves the pity of his friends, nor can he enjoy the conscious satisfaction of having done what he ought.

It is a Dutch maxim, and a good one, “that the man who has spent his whole income, has that year lived in vain;” but the man who has lived beyond his income has not only been useless, but criminal—he has involved himself in difficulties; and, without circumspection, he must defraud the public. By a due attention to numbers alone, can he learn in time how the case stands, and avoid the precipice: I will therefore venture to affirm, that though all other sciences may be in some measure either useful or ornamental, an acquaintance with ARITHMETIC is an indispensable obligation we owe to ourselves, our families, and society. H. S.

THE ART OF THINKING.

BY SIDNEY SMITH.

ONE of the best modes of improving in the art of thinking, is to think over some subject before you read upon it; and then to observe after what manner it has occurred to the mind of some great master; you will then observe whether you have been too rash or too timid; what you have omitted, and what you have exceeded; and by this process you will insensibly catch a great manner of viewing a question.

It is right to study; not only to think when any extraordinary incident provokes you to think, but from time to time to review what has passed; to dwell upon it, and to see what trains of thought voluntarily present themselves to your mind.

It is a most superior habit of some minds to refer all the particular truths which strike them, to other truths more general, so that their knowledge is beautifully methodised; and the general truth, at any time, suggests all the particular exemplifications, or any particular exemplification at once leads to the general truth. This kind of understanding has an immense and decided superiority over those confused heads, in which one fact is piled upon another, without the least attempt at classification and arrangement.

Some men always read with a pen in

their hand, and commit to paper any new thought that strikes them; others trust to memory for its re-appearance. Which of these is the best method in the conduct of the understanding must, I should suppose, depend a great deal upon the particular understanding in question. Some men can do nothing without preparation; others little with it; some are fountains, some reservoirs.

SCIENTIFIC EDUCATION.

DR. RITCHIE states, that to give effect to any system, the teacher must possess certain qualifications. Among these must be an accurate knowledge, not only of the particular branch which he teaches, but also of collateral subjects, that he may be able to draw his illustrations from the most interesting sources. In order to give a boy some confidence in his own strength, the teacher should carefully avoid using any epithet which might lead the boy to believe that he was stupid—the term “dunce” ought not to be known in schools.

The plan usually adopted in teaching elementary science in schools, is the synthetical mode of instruction. The plan recommended as having been found most successful, is strictly analytical. In arithmetic, for example, a system of rules is placed before the pupil, and he is told to do a certain number of sums by those rules. When the boy has succeeded in doing so, he receives praise, and believes that he has done all that is necessary; whereas he has scarcely done anything. He sees not the principle on which the rule is founded. His reasoning powers have scarcely been called into exercise. His memory is thus burthened with a load of rules, without one connecting principle. It is a very common observation with a boy, when he cannot solve a question in arithmetic, that he has forgotten the rule. Had he got principles instead of rules, arithmetic would have become, as it were, a part of himself. He could no more forget these principles than he could forget his own name.

When a boy has obtained an accurate view of the leading principles of arithmetic, which may be attained in a few months, he should be gradually led on to geometry. The ordinary mode of teaching geometry in schools, is to place the *Elements* of

Euclid in his hands. Now this work, notwithstanding its many excellences, is not well adapted to the instruction of boys. The demonstrations are too verbose, and perhaps too formal for youth; and the arrangement, however logical, is not the arrangement according to increasing difficulty of solution, which ought to be the arrangement for instruction; besides, it is entirely synthetical. Reading *Euclid*, as it is called, may improve the memory, and give a sort of mathematical precision to the language, but it certainly does not bring into play the reasoning and inventive faculties of youth. The analytical mode constantly employs the reasoning powers, and is the only mode which can rouse the dormant inventive powers of youth.

Boys are always anxious to see the use of what they learn. Now this may be done from the very commencement of their geometrical studies. Let them be taken out to the fields, and shown the applications by taking the angles subtended by distant objects, which may be accomplished by means of very simple instruments, that can be made for a few shillings. By taking a few angles, and measuring, by means of a tape or chain, a few lines, the boys would be delighted to construct the figure by means of their protractor and diagonal scales, and thus to ascertain by measurement the distances of remote objects, &c.

FACTS IN BRIEF.—Out of every thousand men, twenty of them die annually. The number of inhabitants of a city or country is renewed every thirty years. The number of old men who die in cold weather is to the number of those who die in warm weather, as seven to four. The men able to bear arms form a fourth of the inhabitants of a country. The proportion between the deaths of women and those of men, is 100 to 108. The probable duration of female lives is sixty; but after that period the calculation is more favourable to them than men. One half of those who are born, die before they attain the age of seven. Among 3125 who die, it appears by the registers that there is only one person of one hundred years of age. More old men are found in elevated situations than in valleys and plains.

109—Museum. D. R.—This word was applied by the ancients as a general name to any repository of natural productions, or such curious things as had relation to the arts over which the Muses presided.

110—Luminosity of the Sea. S.—There are few points of natural history which have been so long and so much disputed, as the illumination of the sea water. All that is known with any certainty, may be reduced to the following facts: there are several shining mollusca, which, during their life, emit at pleasure a phosphoric light, which is rather pale, and generally of a bluish colour.

111—Speed of the Magnetic Current. D. S.—The velocity of the galvanic current is about *fifteen thousand four hundred miles per second*. In America, the time of transit between Boston and Bangor was recently measured, and the result was, that the time occupied in the transmission was *one hundred and sixtieth of a second*; and that the speed of the galvanic current was at the rate of sixteen thousand miles per second, which is about six hundred miles per second more than the average of other experiments.

112—The Victoria Regia. J. W.—"Where was this great water-lily, now at Chatsworth, brought from? and when was it introduced into England?"—This magnificent plant was discovered in one of the rivers of British Guiana, in 1837. Various attempts were made by Sir Robert Schomburg to introduce it into Europe, but all to no purpose, until the year 1849, when some seeds, sent to Sir J. W. Hooker, at Kew Gardens, gave germs of active vitality. They were immediately sent to Chatsworth, where, under the care of Sir Joseph Paxton, the plants grew and flowered.

113—Poison of the common Toad. G.—"Is the common impression that toads possess poison, a correct one?"—There seems to be some foundation for this popular belief, if we may trust the report of two French *savans*, Messrs. Gratiolet and Cloez. They inoculated small animals with the milky fluid contained in the toad, and found it productive of fatal effects in a short time. A turtle-dove, slightly wounded in the wing with the liquid, died in terrible convulsions in eight minutes. Five small birds, after inoculation with the deadly poison, died in five or six seconds, but without convulsions.

114—Bleaching Ivory. H. W.—Antique works in ivory that have become discoloured may be brought to a pure whiteness by exposing them to the sun under glasses. It is the particular property of ivory to resist the action of the sun's rays, when it is under glass; but when deprived of this protection, to become covered with a multitude of minute cracks. Any articles in ivory that have lost their colour may be brushed with pumice stone, calcined and diluted, and while yet wet placed under glasses. They should be daily exposed to the action of the sun, and be turned from time to time, that they may become equally bleached.

115—Photographs on Glass. E. M. I.—"I have heard that pictures may be taken from nature by the photographic art, on magic-lantern slides, without pencil or brush. Is this true?"—This is a discovery of great interest. The designs are prepared by the action of light only with the camera obscura, and the smallest details are delineated on the glass with astonishing fidelity. When the slides are magnified in the magic-

lantern, they give a perfect representation of nature, and are quite free from all those defects and inaccuracies existing in the old slides, which cannot be avoided in painting upon so small a scale.

116—Strolling Schools. W. S.—Our correspondent has sent us a plan for ensuring an universal system of Home Education, which we do not insert, however, as it is wholly impracticable. His system is based upon that of the Strolling Schools in Prussia, which he thus explains:—"The teacher, with his scholars or his classical furniture, establishes himself in all the houses of a village successively where he affords instruction; and his stay is determined by the number of persons he is called upon to instruct under each roof, a week being the allotted term for each child, during which period the parents supply all the wants of the *Domine*."

117—Influence of the Moon on Rain. J. M. R.—From the comparison of a series of observations, continued for twenty-eight years at Munich, Stuttgard, and Augsburg, by Professor Schubler, it appears that the maximum number of rainy days takes place between the first quarter and the new moon. The number of rainy days in the last of these intervals, is to that in the first as 696 to 845, or in round numbers as 5 to 6. And this proportion is not only true of the twenty years taken together, but also of the separate groups of four years, which give analogous numbers; we therefore conclude that it rains more frequently during the increase than during the wane of the moon. The results maintained by Schubler received support from a series of observations made by Pilgram at Vienna.

118—Vocal Machinery of Birds. W. S.—It is difficult to account for so small a creature as a bird making a tone as loud as some animals a thousand times its size; but a recent discovery has shown, that in birds the lungs have several openings communicating with corresponding air-bags or cells, which fill the whole cavity of the body from the neck downwards, and into which the air passes and repasses in the progress of breathing. This is not all; the very bones are hollow, from which air-pipes are conveyed to the most solid parts of the body, even into the quills and feathers. This air being rarefied by the heat of their body, adds to their levity. By forcing the air out of the body, they can dart down from the greatest heights with astonishing velocity. No doubt the same machinery forms the basis of their vocal powers, and at once solves the mystery.

119—Mezzotinto Engraving. C.—"Is not the discovery of this art attributed erroneously to Prince Rupert? And who may be considered as having originated it?"—The real inventor of this art was Louis Von Siegen, a lieutenant-colonel in the service of the Landgrave of Hesse Cassel, from whom Prince Rupert learned the secret when in Holland, and brought it with him to England, when he came over a second time in the suite of Charles II. Some curious and very rare prints, that were purchased on the Continent, and now deposited in the British Museum, place the claim of Von Siegen beyond doubt. In this collection is a portrait of the Princess Amelia-Elizabeth of Hesse, dated 1643, which is *fifteen years anterior* to the earliest of Prince Rupert's dates. In the same collection is another curious work by Von Siegen, a portrait of the Queen of Bohemia, dated 1643, which places the question beyond all dispute.

120—Cause of Volcanic Eruptions. E. H.—Humboldt, in his *Aspects of Nature*, says, "All volcanic phenomena are probably the result of a communication, either permanent or transient, between the interior and exterior of the globe. Elastic vapours press the molten oxydising substances upwards through deep fissures. Volcanos might thus be termed intermitting springs, or fountains of earthy substances, *i. e.* of the fluid mixture of metals, alkalies, and earths, which solidify into lava currents, and flow softly and tranquilly, when, being upheaved, they find a passage by which to escape.

121—Invention of the Telescope. G. W. C.—Galileo appears to be justly entitled to the honour of having invented that form of telescope which still bears his name; whilst we must accord to John Lippershey, the spectacle-maker of Middleburg, the honour of having previously invented the astronomical telescope. The interest excited at Venice by Galileo's invention amounted almost to frenzy. On ascending the tower of St. Mark, that he might use one of his telescopes without molestation, Galileo was recognised by a crowd in the street, who took possession of the wondrous tube, and detained the impatient philosopher for several hours, till they had successively witnessed its effects. These instruments were manufactured in great numbers, but were purchased merely as philosophical toys, and were carried by travellers into every corner of Europe.

122—Discovery of Caoutchouc. B.—For the first knowledge in Europe of the source of caoutchouc and the means of its production, we appear to have been indebted to some French Academicians, who were sent out for the purpose of astronomical observation in 1735: they discovered that it was a white milky juice of certain plants, found abundantly in Para in the Brazils, in Quito, and since found in Asia and several other places. They grow so extensively in some places that hundreds of miles are covered with them: thus there is no fear of the material falling short of the demand. One of the first uses to which caoutchouc was applied appears to have been the well-known property of rubbing out black-lead pencil marks, and hence, probably originated the name, by which it is now better known in this country, of *India Rubber*.

123—Hieroglyphics. J. D.—Hieroglyphics consist in certain symbols which are made to stand for invisible objects, on account of some analogy which such symbols were supposed to bear to the objects. Egypt was the country where this sort of writing was most studied, and brought into a regular science. In hieroglyphics was conveyed all the boasted knowledge of their priests. According to the properties which they ascribed to animals, they chose them to be the emblems of moral objects. Thus ingratitude was expressed by a viper; imprudence, by a fly; wisdom by an ant; knowledge, by an eye; eternity, by a circle which has neither beginning nor end; a man universally shunned, by an eel, which they supposed to be found with no other fish. Sometimes they joined two or more of these characters together, as a serpent with a hawk's head denoted nature, with God presiding over it.

124—Provident Society for Male Teachers. H. G. T.—A correspondent, who belongs to that respectable and laborious class of society, school teachers, suggests that some establishment should

be formed for members of his profession, similar to the Governesses' Benevolent Institution, in which, on emergency, a temporary home might be found, and means be employed to procure a situation for those who wanted it. The writer conceives that a society of this kind might be supported by subscriptions from persons interested in such a project throughout the kingdom. We always feel pleasure in recommending any scheme of permanent and incontestable utility.

"Let philanthropic feelings rise
In every mortal human breast;
In union's bond true greatness lies,
When formed to succour the distress'd.
When blest with health, in time provide
For ills unseen, some prudent plan,
Where, in distress, we can confide:
Friendless, how impotent is man!"

125—German Origin of the English Language. R. F.—The question of our correspondent is answered by Dr. Latham, who says that the English language is not the original language of any of the British Islands altogether, or of any portion of them. Indeed, of the whole of Great Britain it is not the language at the present moment. Welsh is spoken in Wales, Manx in the Isle of Man, Scotch Gaelic in the Highlands of Scotland, and Irish Gaelic in Ireland. Hence, the English that is now spoken was once as foreign to our country as it is at present to the East Indies; and it is no more our primitive vernacular tongue, than it is the primitive vernacular tongue for North America, Jamaica, or Australia. Like the English of Sydney, or the English of Pennsylvania, the English of Great Britain spread itself at the expense of some earlier and more aboriginal language, which it displaced and superseded.

126—Shorthand. X. Y. Z.—Our remarks on shorthand, Appendix, p. 11, vol. iii., induced, by a question proposed by one of our correspondents, has occasioned the receipt of several communications on the subject from intelligent writers. We give the following for the use of our readers generally:—"Having seen, in the *Family Tutor*, a desire expressed that those who practice shorthand, would forward their opinion relative to the most eligible of the many systems that are now extant, I now write to inform you that, for two years I have been in the habit of taking notes of sermons, and for the last twelve months have been able to secure them almost verbatim. The system of shorthand I employ, is that of Mr. Isaac Pitman, of Bath, well known by the name of Phonography. I have not practised any other system, but I can confidently vouch for the simplicity, brevity, and accuracy of Phonography. We need use no arbitrary symbols for uncommon words, for the system provides means of expressing any sound in the language with the greatest facility. If your correspondent is desirous of acquiring Phonography, there is a society established called the Phonographic Corresponding Society, for the purpose of advancing the system. A list of the members of this society he may obtain of Mr. Frederick Pitman, 20, Paternoster Row, London. As I am myself a member, if your correspondent will address a letter to X. Y. Z., Post Office, Dudley, I will forward him the necessary information for procuring works devoted to the Phonographic system."

POPULAR GEOLOGY.

CHAPTER X.—SECONDARY STRATA: THE CRETACEOUS, OR CHALK SYSTEM. TERTIARY STRATA.

Deposition.—We have now arrived at the last (or uppermost) strata of the secondary formation. In Europe, these were deposited in the same sea—or oceanic—basins, as their predecessors, though in America it was not so. Generally, we find the Chalk strata overlying the Wealden, or, where that is wanting, the Oolitic.

The name Cretaceous is derived from the Latin—*creta*, chalk—and was applied to the strata in question in consequence of the chalk being the highest member in those parts of Europe where the system was first studied.

Structural Changes in the Sandstones, &c.—The chief changes that now took place in the material of the earth's crust, were the conversion of the sandstones into loose sand—known as the Green sand—of the clayey beds into a marly clay, called Galt, and of the limestone into Chalk. These three, therefore—Green sand, Galt, and Chalk—form the main bulk of the Cretaceous system.

The Green Sand, or Shankland, as it is sometimes called, consists of a triple alternation of sand, clay, and sand. The distinctive colour is owing to the presence of silicate of iron. Sometimes, however, a yellowish tint prevails. Ochre, fullers' earth, and cherty* beds, are occasionally found in the Green sand. This series is altogether absent from the chalk group of the North of England:

Galt forms a stiff, blue, and very dark-coloured clay, abounding in shells, which are often remarkable for their pearly lustre. The American Chalk system has no Galt. The beds of Galt are not very thick. They occur with alternations of Green sand, and contain balls of clayey ironstone and iron pyrites. The reddish colour often found in Galt is owing to the presence of iron.

Chalk, the predominant, is also the most interesting feature of the group. It consists of carbonate of lime—generally of a pure white, but sometimes of a red, or dusky grey colour. It is often found in a hardened state, and crystallized almost like marble. These qualities are attributed to the action of the igneous subterranean agencies. This theory has, to a certain extent, been proved by experiment. When pounded chalk is enclosed in an iron tube, and subjected to great heat, it becomes similarly hard and crystalline. This, like the Green sand, is often subdivided into upper and lower beds. The upper chalk beds are of a compact texture, a dusky-white hue, mixed with green grains, and containing but few flints. The lower ones are much softer, more calcareous, and contain nodules of chert, and regular layers of flint—the latter giving almost the only indications afforded by the chalk beds of regular stratification. The formation of flint and of chalk are among the more interesting problems of geology.

Flint.—The upper chalk beds form the true native placè of this mineral, where it occurs in regular layers, consisting either of nodules or flat tabular masses, extending to a great distance in certain parts—as in the chalk cliffs east of Dover, where a flint bed, two miles long, is found. The nodular masses vary in size from an inch or so up to a yard. Flint consists essentially of a mass of grey or black silex, coated over with a white cherty crust, and containing, not unfrequently, cavities lined with chalcedony or crystallized quartz. Who would suspect that a mineral bearing these characteristics is, after all, little less than a mass of extinct life? Yet this is, in all probability, the case. Most flints enclose remains of sponges, echinites, &c. These organisms were

* Chert is a mineral nearly allied to flint and chalcedony, but less homogeneous and simple in texture.

the nuclei round which the particles of silex accumulated. But whence these particles in a substance—chalk—so different? The great animalculæ observer, Ehrenberg, suggests that it is the remains of the flinty coverings of microscopic creatures, whose shells he has, in other cases, discovered in their original condition. This is the more probable from the facts discoverable in the study of the formation of the

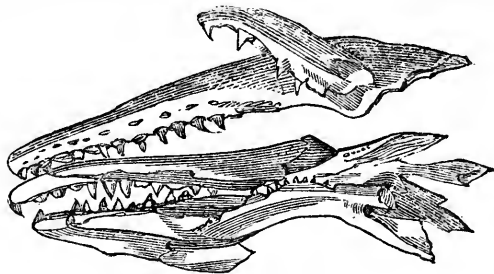
Chalk.—It had often been suspected that chalk might be of animal origin, notwithstanding the fact that no traces of animal remains could be discovered in certain chalk masses; for, in the first place, it consisted of pure carbonate of lime, such as would remain from the decay of corals, &c., and, secondly, such fossils, when half decomposed, seemed to be also half changed into chalk—or a something greatly resembling it. But certain discoveries have made this speculation all but a certainty. A traveller, Lieutenant Nelson, has shown that there are several lagunes of the Bermuda islands, which are surrounded by coral reefs, and which have, at their bottom, a soft, white, calcareous mud, evidently formed of the decay of various tribes of corals. When dry, this mud is scarcely, if at all, to be distinguished from chalk. Mr. C. Darwin has observed similar facts in the Pacific coral islands. He believes that much of this white mud has passed through the bodies of worms, who have everywhere bored through the coral rocks. Other portions, he thinks, have passed similarly through the bodies of fish, who may often be seen browsing, in great numbers, on the living corals—just like so many quadrupeds in a field, on the growing grass. Their intestines have been found filled with impure chalk; and thus we get an explanation of the bodies formerly known as the cones of the larch, but which were subsequently found to be the excrement of fish. Ehrenberg, however, goes much further. He states that chalk is composed, partly of inorganic particles, and partly of shells of such inconceivable minuteness that a cubic inch of chalk would contain above ten millions of them! The chalk of the north of Europe contains much more inorganic matter than that of the south—the latter being often composed almost entirely of what was once alive! He has succeeded in discovering the character of many of these minute creatures; some belong to the nautilus family. The same observer has found microscopic sea-plants in the chalk.

The Organic Remains generally show that they were deposited at the bottom of seas or oceans—for no recent formation is so destitute of terrestrial organisms. Fragments of ferns, cones of coniferous trees, cycadixæ, strips of lignite (wood coal)—such as is found in the lower chalk near Rochelle, in France—are the more noticeable of the vegetable terrestrial remains of the period. Many pieces of wood have also been discovered, both in Europe and in America, drilled full of holes by the *Teredo*, thus showing that they had long drifted about in the ocean, and that the conditions of life were, to a certain extent, somewhat similar over great portions of the globe.

In other respects the fossils of the Chalk system are very rich. As Sir H. de la Beche observes, "Organic remains are, in general, beautifully preserved in the chalk; substances of no greater solidity than common sponges retain their forms; delicate shells remain unbroken; fish even are frequently not flattened; and altogether we have appearances which justify us in concluding that since these organic exuvixæ were entombed, they have been protected from the effects of pressure by the consolidation of the rock around them, and that they have been very tranquilly enveloped in exceedingly fine matter, such as we should consider would result from a chemical precipitate."

As all the ordinary and more noticeable orders—though of very different genera—of the sea inhabitants existing up to the Cretaceous era, have been found in the chalk formation, with the exception of the whale family, we need not recapitulate them, but content ourselves with a word or two upon the more special features of the zoology of the latter:—First, as to the fishes, which had existed up to this period in two orders only, the Ganoids and Placoids; now these orders decline, and fishes of a higher organisation appear, resembling those which exist in our own time—that is to say, bony in structure, with corneous scales. The reptiles contribute the most interesting additions to the growing zoological wealth. Among these occur the *Mosasaurus*,

which was first made known to us by the discovery of a perfect head, near Maastricht, and hence the name given to the creature of "The Great Animal of Maastricht." This was thought, at first, to be a crocodile, then a whale; but Cuvier has proved that it was a great marine reptile, nearly allied to the Monitors. We may here mention one of the facts that belong to the glories of science, and which contribute wonderfully to its support by showing us how much faith can safely be reposed in its statements. Cuvier asserts of this animal that before he had seen a single vertebra (joint of the back-bone), or a bone of any of its extremities, he was enabled to announce the character of the entire skeleton from the examination of its teeth and jaws alone, nay, even from a single tooth! When the Mosasaurus first appeared, some of the largest creatures that roamed beneath the deep waters were saurians of gigantic stature, who controlled the excessive increase of the then extensive tribes of fishes. From the lias upwards, to the commencement of the chalk formation, the Ichthyosauri and Plesiosauri were the tyrants of the ocean; and just at the point of time when their existence terminated, during the deposition of the chalk, the new genus Mosasaurus appears to have been introduced to supply for awhile their place and office, being itself destined in its turn to give place to the whales of the tertiary period. No saurians of the present world are inhabitants of the sea, and the most powerful living representatives of this order, *viz.*, the crocodiles, though living chiefly in water, have recourse to stratagem rather than speed for the capture of their prey. But the Mosasaurus was so constructed as to possess the power of moving in the sea with sufficient velocity to overtake and capture large and powerful fishes. Thus its teeth and jaws were enormous; and the animal itself was probably not less than five-and-twenty feet in length, although the longest of its modern congeners does not exceed five feet. The head of the Mosasaurus, here represented, measures four feet in length; that of the largest Monitor does not exceed five inches. The animal resembled the Iguanas in having teeth-apparatus so placed in the mouth as to act as barbs, preventing the escape of the prey. The vertebrae were fitted with a ball and socket-joint, so as to admit easy and universal flexion. The tail was flattened on each side, but high and deep in the vertical direction like that of the crocodile, so as to form an oar of immense strength to propel the body by movements analogous to those of sculling. Instead of legs, the Mosasaurus had four large paddles, like those of the whale, which were probably used to enable it to rise to the surface for respiration.



THE MOSASAURUS.

The specimen from which the cut is taken was discovered in 1700. At the capture of Maastricht by the French, it was taken away from that town and deposited in the Museum at Paris, where it now is. Our readers may judge of the value attached to it, when they are told that the French artillerymen were directed not to point their artillery towards that part of the town where the precious relic was deposited.

The American chalk formation also gives us a new gigantic reptile, the Saurodon, so called from the lizard-like character of its teeth. Bird footsteps are here again discovered, as, for instance, in the slate of Glaris, in Switzerland, a group corresponding with our gait; also in a chalk bed near Maidstone. They belong, it is supposed, to birds of the long-winged swimmer family, and were of the size of the albatross. Lastly, we may mention that individuals of the monkey tribe—the highest below Man, whom we now are fast approaching—are discovered in the chalk; a fact that, taken in connexion with the appearance of the neighbouring tropical plants, the cycadeæ, shows that during its deposition a tropical climate prevailed.

Igneous Rocks associated with the System.—The Cretaceous group generally has suffered but little from volcanic disturbance, though where the latter has happened, the

effects have been on a magnificent scale, as in Ireland, where eruptions of basalt and other allied rocks have burst through and spread over the chalk to an enormous extent. The Giant's Causeway, already spoken of, presents one of the finest examples of this character.

Local Distribution.—In England the chalk group extends in a long stripe from Kent to Yorkshire, and occupies nearly the whole of the south-eastern parts—filling up the hollows left by the lias and oolite. Salisbury Plain is occupied by the upper chalk beds. The cliffs of Dover belong to the chalk formation. It extends also into the north of France, thence onward into Germany, Scandinavia, and Russia, and covers a vast area in the United States.

Scenery, &c.—The chalk is often covered with the tertiary strata, but it is also often denuded, or left bare. Independent of the colour—which becomes every here and there perceptible in chasms, &c.—the chalk districts are easily recognised by the smooth, flowing outlines of the hills and valleys, forming, in many parts, a scene of charming undulations, well known to most persons under the denomination of “wolds,” or “downs.” The contrast between the upper and lower members of the group, in their effects upon scenery, is very striking. While we find one writer describing the chalky southern downs of England as “covered with a sweet, short herbage, forming excellent sheep pasture, generally bare of trees, and singularly dry, even in the valleys, which for miles wind and receive complicated branches, all descending in a regular slope, yet are frequently left entirely dry, and, what is more singular, contain no channel, and but little other circumstantial proof of the action of water, by which they were certainly excavated,” another thus speaks of the Green sand country between London and Portsmouth:—“In crossing this desolate region by the main road from London to Portsmouth, it is difficult to believe that we are only forty miles distant from the capital, and mid-way to one of the chief naval establishments of the empire; but the nature of the soil effectually prevents improvement, and it is not impossible that this tract may remain for centuries unchanged, and still exemplify the power of geological causes in modifying the civil condition of countries, as well as their extinct features.”

Uses.—The lower beds of Green sand are quarried for calcareous matter, to be used in building, and as lime. There, too, is found, in the Weald of Kent, the Kentish rag-stone. A stone, nearly allied to the rag, is said to have been obtained from Boughton, near Maidstone, for the erection of Westminster Abbey. From the Green sands of Black Down Hills, Devonshire, are obtained whetstones, and many of the neighbouring inhabitants are employed in the manufacture. The chalk is used as a polishing powder or paste, for painters' whiting, &c. The flint is the most valuable mineral of the group, contributing so largely as it does to the manufacture of porcelain and glass. Gun-flints, formerly an article of considerable commercial importance, are now superseded by percussion caps.

TERTIARY STRATA.

Geological Contrast between the Secondary and Tertiary Formations.—Pausing for a moment, as we now find ourselves approaching towards the close of our journey, we are struck by certain special differences between the two formations—that which we have just passed through, and that we are now about to examine. For instance, while the secondary strata retain generally a uniformity of character over immense spaces of territory, thereby suggesting the idea of an uninterrupted sequence of certain general physical agencies, the tertiary strata exhibit an almost boundless local variety, and present unmistakeable relations to the existing forms of sea and land. The earth's superficial movements, during the tertiary era, seem to have been mainly confined to a general and equable rising, which had the effect of lifting above the waters all the additional part of the crust, which was considered necessary to the development of a higher and more extensive system of organic life than had previously existed. Not that nature had ceased altogether to put forth her strength in the exhibition of the more stupendous

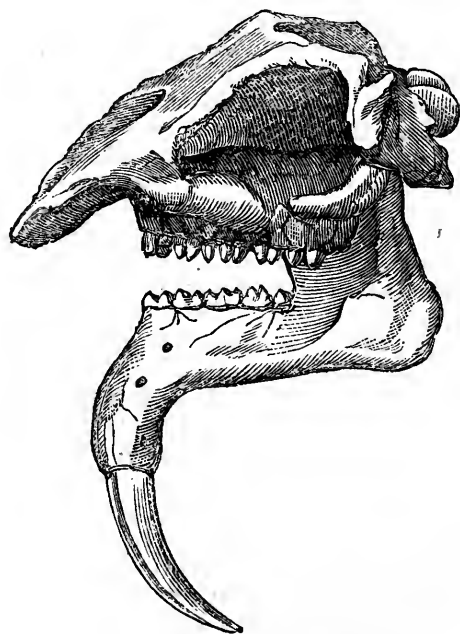
phenomena; on the contrary, some of the grandest belong to this time. The Pyrenees were now raised. The Alps, from the Mediterranean toward Mont Blanc, reared its sublime forest of peaks. Such events would, of themselves, materially effect the relative levels of the sea and land.

Deposition.—Although the chalk formation is the highest that extends over a very large portion of the earth's surface, there exist in the hollows or basins formed by its beds, masses of clay, limestones, marls, sand, and gravel, loosely congregated, and of no very great thickness, but showing unequivocal marks of stratification, that is to say, of having been regularly deposited as marine or fresh-water sediments. It is this latter feature that distinguishes the strata of the group from mere superficial and accidental accumulations, such as we shall speak of in our next chapter. London and Paris both rest on basins of this kind. It is not difficult to decipher their history from an examination of their component parts. We shall take for this purpose the richer of the two basins, that of Paris, premising that such basins are considered to be beds of gulfs and estuaries, left at the conclusion of the chalk period. Beginning from the bottom of the Paris basin, we find, first, a fresh-water deposit of clay and limestone, showing that the estuary had been stopped at the mouth by drift, or by a change of level, and thus become an inland lake. Above this stratum we find one of marine limestone, showing the sea had again broken in, and restored the estuary. Still ascending, we arrive next at a second fresh-water formation, which includes gypsum; then a second marine deposit of sandy and limy beds, surmounted finally by a third series of fresh-water strata, showing how many times that particular spot had changed its character from estuary to lake, and lake to estuary, before there was final rest. We find existing phenomena corroborative of this view. In the deltas of such rivers as the Niger, the connexion of pieces of fresh water with arms of the sea, is not uncommonly severed, for a time, by the accumulation of sand—or mud—banks or bars, which being again, for a time, broken through, the former state of things is restored.

Zoological Contrast between the Secondary and Tertiary Strata.—We have already pointed out one great difference between the secondary and tertiary strata—that concerning their peculiarly geological characteristics; we must now speak of another—their striking zoological distinctions. While the organic life of the former is obviously and entirely distinct from our own day, in the latter, on the contrary, it is the resemblance to the present state of things that forcibly attracts the attention. Indeed, the extent of the change between the two periods is so great, that the close of the secondary formation resembles the close of the Palæozoic period already spoken of—that is to say, there almost seems to have been an entire cessation, followed by a new creation, of life. The tertiary period is, in fact, the dawn of existing zoological science. From its commencement, and more and more as we ascend, do we find an increasing number of forms identical with those now living. The abundance of shell-fish is one of the most noticeable features; and as the quantity found varies, it is supposed, in accordance with the date of the strata in which they are embedded, Sir C. Lyell has made use of the shell-fish to divide the whole Tertiary period into four eras—the Eocene, or dawn of recent animals, at the bottom of the group, which contains little more than 3 per cent. of surviving species; the Miocene, or less recent, which contains 18 per cent. of existing species; the Pliocene, or more recent, which yields from 35 to 50 per cent.; and the Pleistocene, the most recent, which affords from ninety to ninety-five per cent. of existing species. The mammalian remains of the earliest, or Eocene period, are highly important. Those of Paris alone have given forth to the light of our day some fifty species, all of which have long been extinct. The greater number belong to the order of Pachydermata, or thick-skinned animals, and to a family allied to the Tapirs, which is now confined to S. America and Sumatra. In another part of the Paris Eocene, the remains of the first known bi-hooved animal, the Anoplotherium, have been discovered. It is supposed to have been as large as an ass, but not so high, with a long tail. It is believed that its habits were aquatic, and that it was an expert swimmer and diver, though also accustomed to browse upon land. During this period

fresh-water reptiles existed, serpents as large as the boa, birds of various kind, species allied to racoons, and foxes, also bats and monkeys. In America, the Eocene tertiaries make known to us the Zeuglodon, a herbivorous feeding-whale with an enormous tail, and reaching altogether to the length of a hundred feet.

In the Miocene fossils we find animals allied to the bear, horse, dog, and to the feline family, &c. Here also occurs the Dinotherium, an enormous species of tapir, exceeding in size the largest fossil elephant. Here is the portrait, as restored to us by Professor Kaup, of

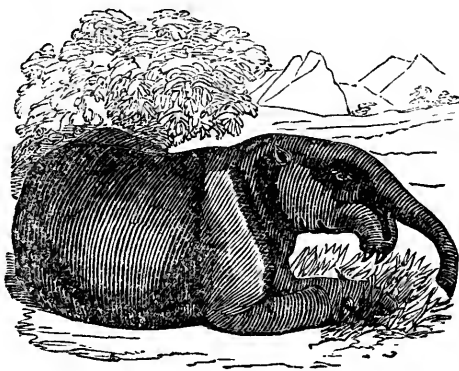


THE DINOTHERIUM.

The tusks are peculiarly the interesting feature of the Dinotherium's anatomy. Dr. Buckland has studied this subject with his usual earnestness and fulness of knowledge, and gives us, as the result, an interesting glimpse of the creature's habits. He says, "It is mechanically impossible that a lower jaw nearly four feet long, loaded with such heavy tusks at its extremity, could have been otherwise than cumbrous and inconvenient to a quadruped living on dry land. No such disadvantage would have attended this structure in a large animal destined to live in water; and the aquatic habits of the family of Tapirs, to which the Dinotherium was most nearly allied, render it probable that like them it was an inhabitant of freshwater lakes and rivers. To an animal of such habits the weight of a tusk sustained in water would have been no source of inconvenience; and if we suppose them to be employed as instruments for raking and grubbing up by the roots large aquatic vegetables from the bottom, they would, under such service, combine the mechanical powers of the pick-axe with those of the horse-harrow of modern husbandry. The weight of the head, placed above these downward tusks, would add to their efficiency for the service here supposed—as the power of the harrow is increased by loading it with weights. The tusks of the Dinotherium may also have been applied with mechanical advantage to hook on the head of the animal to the bank, with the nostrils sustained above the water so as to breathe securely during sleep, whilst the body remained floating at perfect ease beneath the surface: the animal might thus repose, moored to the margin of the lake or river, without the slightest muscular exertion, the weight of the head and body tending thus to fix and keep the tusks fast

anchored in the substance of the bank—as the weight of the body of a sleeping bird keeps the claws clasped firmly around its perch. These tusks might have been further used like those in the upper jaws of the walrus, to assist in dragging the body out of the water, and also as formidable instruments of defence. The structure of the scapula seems to show that the fore-leg was adapted to co-operate with the tusks and teeth in digging and separating large vegetables from the bottom. The great length attributed to the body would have been no way inconvenient to an animal living in the water, but attended with much mechanical disadvantage to so weighty a quadruped on land. In all these characters—the gigantic, herbivorous, aquatic quadrupeds—we recognise adaptations to the lacustrine (from *lacus*, a lake) condition of the earth, during that portion of the Tertiary periods to which the existence of these seemingly anomalous creatures appears to have been limited.”

The Pliocene period is remarkable for its animals of the thick-skinned kind. This is the era of the Mastodon and Mammoth—both fossil elephants of gigantic size. One individual Mammoth was found in Siberia, in 1801, with its flesh and hide entire, preserved by the ice in which it was embedded. Obviously, therefore, these animals, though extinct now, must have lived to a comparatively very recent period. All the principal mammalian forms appear by this time on the earth. To those already enumerated, the Pliocene adds hyænas, badgers, otters, weasels, wolves, &c. It is an interesting fact to us, as English persons, to know that, in this country, there were beavers of large bulk, bears, hippopotami, and the rhinoceros. In India, there were, at the same time, monkeys of extraordinary size, and a tortoise eighteen feet long. The family of sloths possessed some most extraordinary representatives in the *Megatherium*, *Mylodon*, &c., who obtained their food by breaking down and devouring trees.



Uses, &c.—Passing over the igneous rocks associated with the system, of which we have already said all that is necessary in a preceding paragraph, and also over the scenery, which varies little from that of the preceding group, we may thus indicate the chief uses of the tertiary rocks. From the upper limestone of the Paris basin are obtained the well-known Burr-millstones; also a marble, susceptible of high polish, and which is very ornamentally marked by the shells embedded in it. A marl, for manure, is obtained from the disintegration of some of the limestones. Pipe and potters' clay are dug up both from the London and the Paris basins. From the latter is also obtained the famous plaster of Paris, which is gypsum, or sulphate of lime, reduced to powder and kneaded with water, for the purposes of the plasterer, the stereotype-founder, who makes his moulds of it, and the image-maker, who sends forth into our streets so many cheap and beautiful copies of the finer works of our sculptors. The gypsum itself is largely used for manure. Lignite, or wood-coal, is found in some tertiary strata—for instance, near Exeter. Amber is often found with the lignite, and is supposed to be gum that exuded from the same or neighbouring trees that formed the lignite.

THE MIRROR OF NATURE.

(Continued from page 255.)

BUT, on the other hand, man, highly endowed as he is, must, through the thoughtful industry of his hands, provide himself clothing for his body, which shall cover him only lightly in the hot season of the year, and protect him from the cold in winter, while the plumage of the goose and the duck, as well as the fur of many quadrupeds, takes an increased thickness at the approach of winter, which in spring is exchanged for a lighter natural garment. What dress of man, prepared of the choicest stuffs and fashioned with the highest art, can compare in beauty and splendour with the plumage in which many birds, sparkling in all the colours of jewels, appear at the time of their nuptials; and how poor, besides, would man's winter wardrobe especially look, if for the fabrication and decoration of his garments he could not avail himself of the wool and fine furs with which the forming power of Nature furnishes animals without their co-operation. Man must take great pains to form the weapons he uses in war, or to prepare the tools with which wood and stone are wrought; the weapons of the stag grow out of his own body, and so is it with the wood-sawing wasp and the shell-fish, which, with its file-shaped mouth, works its way into the rock. That which is accomplished in man and in the animal, in the former by understanding, and in the latter by instinct, in ways outwardly perceptible, enters still more fully into the hidden, inner circle of forming and fashioning forces in the plant. The plant needs no artificial arrangement of store-rooms, no gathering of food for the seed or the germ which it leaves behind it when it dies; but to the grain of wheat and the eye of the potato is furnished, from its first formation, an abundance of nourishment that fully suffices for the development of the germ.

Here the agencies of instinct, which manifest themselves among animals in an impulse to wander forth for food, and to annual migrations, and in the art of preparing their abodes, are transferred to the inner parts and elements of the individual plant or animal body, without suffering any change of their nature and purpose. For

when every substance which the animal takes for food, so soon as it enters into the circle of its life, finds its way through all the regions of the body to its destined place—the lime to the bones, the silica to the hair, the iron to the blood, the sulphur and phosphorus to the brain and nerves, and thence to the bones—shall it be less wonderful than the migrations of the swiftly and lightly moving bird to the place of its birth and its food? When whole masses of material elements that have become worthless, press toward the surface of the body in order to escape by the perspiration of the skin, and to lose themselves in the ocean of air, is it not the same impulse which collects so many hurtful insects to whole clouds, and guides them off into the sea, so that the land may be freed from the burthen of their excess? We admire the generous excitement which is communicated to an ant-hill or a beehive the instant any external force has broken into it, or when any danger threatens the same from internal enemies. But when, upon a limb's being wounded, or a bone broken in the body of an animal, all the forces and fluids of the same, instantly inflaming, haste to unite to heal the wound or the fracture; and when this endeavour is successful, when in the diseased state of the body, the storm of a fever is raised, which, when it is powerful enough, decomposes and drives away the morbid particles—shall this, in a less degree, command our admiration? The spider prepares ingenious nets to catch the prey, which serves it for food;—is the structure of the several secretive organs, which fashion themselves in the body, in order to produce bile in the liver, and bone in the membrane of the bones, out of the elements which have been introduced through the blood—is not this structure as ingenious, and are the fine webs and formations of which the animal body is made, and which are perpetually renovated, inferior to the web of the spider or to the buildings of the bee or the beaver?

Everywhere, as we have seen in a foregoing chapter, instinct is the agency of that creative power, by which all visible beings are adjusted to one another, like the parts of a house or a temple by an intelligent master-builder and his subordinate labourers. Every living being is, in the ranks of these labourers, employed in the

construction of the whole. The solitary workman who places the top-stones on the pinnacle, and fastens them there with mortar, attends only to this work of his hands, he heeds not what the hod-carriers are doing below as they prepare the materials, which come from the earth, the stones and the mortar, and carry them up to the labourer who is helping to complete the great structure. Only the master-builder, to whom the care of the whole is devolved, goes with his all-ordering eye, to the humblest labourer below, who is digging out and preparing the materials of the edifice, and adjusts the labour of all the workmen, of those who carry the brick and stones, as well as of those who are at work at the top, to the general plan of the whole.

When the morsel of nourishment, or the refreshing draught has entered the mouth and passed into the stomach, then we take no heed how, out of the same, the gastric juice and the blood is prepared, nor how by the breath from the blood the animating flame is kindled and kept alive upon the altar of life; we remark nothing of the formations and dissolutions of single parts, which take place in our bodies. The working of the soul in the body and on all the elements of the same, resembles a mighty motion, which carries along with it in its own direction, everything moveable that comes into its vicinity. The beam of the sun, wherever it reaches, can only illuminate and warm; the flame of fire can and must produce in everything combustible, which it touches, only a similar flame. So in the soul's life, which is a working and moving towards a certain aim, dwells a power of making everything which comes within its sphere, help to the accomplishment of its end, and in its career, carrying it along with it to the appointed goal.

The blowing of the wind carries all light bodies with it in its own direction. When an eagle, ascending from the ground, excites this motion of the air by the powerful force of its wings, the light dust, which lies on the ground, whirls away after him, but the eagle, who has in his eye only the aim of his flight, observes it not, for the dust is external to him and below him. So, too, the animating principle of the animal and of the plant imparts the

direction of its own life to the material substances which it forms into a body, to be the instrument of its activity, and sets in motion for its service. The material is brought to it from without, and handed to it, for the advancement of the grand edifice of the whole, from a depth which its eye cannot fathom. But He, whose work both the material is, and its preparation, by whose act and whose will the same material is transmitted from hand to hand, until we behold it upon the visible pinnacle of the building, sees and knows the whole method of the plan, already pre-arranged in his mind.

II.—THE COMPASS.

THE first man who made the discovery that there is an iron stone—the magnet, which attracts other iron, may have wondered not a little at this quality in an unsightly stone. As the animal seizes the food, so the magnet seizes the iron, but it does not consume it, it converts it into its like, for if a steel needle (a common sewing-needle,) remains for a space of time in union with the magnet, then after it is withdrawn, it is not only attracted more powerfully by the magnet, but it now also attracts other needles or small particles of iron. With an iron needle, thus become magnetic, the experiment was probably made in the first instance merely by way of amusement, by letting it float, like our little artificial magnetic fishes, in a dish of water on a little chip of wood or cork, or by suspending it by a thread, in order the more easily to observe the readiness with which it followed the magnet. In this case it must have been remarked that the magnetic needle with its two ends constantly stood when at rest in the same direction. In some way of this sort, the compass was invented, which, in its earliest form, was a simple magnetic needle, suspended by a thread or floating upon some light substance in water, which, by its constant position, north and south, even under the cloudiest skies, pointed out the situation of countries, and thus, especially when a better and more convenient form was given to it, became a sure guide to travellers by land and sea.

When the migratory bird, or when other animals are led by the ruling force of Nature, out of their previous sphere of life

far over land and sea to a distant goal, they, indeed, have no need of our compass; but when we, with our inquiring reason, wish to follow the instinct of the animal upon its dim and circuitous paths, then the knowledge of the nature of the compass comes to our aid.

The quarters to which the freely moving magnetic needle turns of itself, are in general the regions of the earth's poles, the north and the south; each of the two ends of the needle represents in little a pole of our globe, and is attracted in its motion towards the pole which befriends it. The property on which that motion rests is called polarity. When two such needles or two magnets of equal strength are brought near to each other, it is observable that those ends which in both are turned towards the north or the south do not mutually attract but repel each other, the north pole of the one attracting the south pole of the other, and the reverse. So that it may be said that each pole of a body of equal polaric properties attracts not that which it is itself, but rather that which it is not.

When we now further ask, on what is all polarity in nature based, the answer is briefly this: On the presence of a Creator in opposition to his creations; upon the continuous energy of a creating and upholding divine power, in the whole creation.

The Creator has placed in every one of his creatures, in the mighty stars of heaven and in the grain of sand, in the spirit of man and in the forming life of the smallest moss, a certain measure of his own power, a creative force and energy, by which the individual being exists and continues. This indwelling derived power it is, which, as we saw in the preceding chapter, repeats, in every living body, a work of creation in little, inasmuch as it unites the single elements and parts to a well-ordered whole. As the magnet communicates its magnetic property, or polarity, to every atom of iron which it attracts, the same is done by the creative power of the soul of things to the substances which it draws within the sphere of its activity; each of these receives a certain measure of creative power—it becomes polaric. For polarity consists in this, that a thing, by virtue of its implanted power, can place itself to another thing in the relation of the moving to the

moved, like the Creator to his creations, while again it can take to yet another thing, a subordinate position, that of a moved to its mover.

The activity of that polarity which is called forth in all parts, in every drop of blood and in every fibre, from the life of the same, is just that we have previously described, as the business of the carrier working from below upwards. The beginning and the continuance of all their living action and motion, in all souls, comes from the power of the Creator himself, and this it is, whose all-considering foresight appoints to the impulse or instinct, that takes its origin from the all-embracing power, its sure path. The north pole of the earth, or that magnetic efficacy which comes from the depths of the planet, is far removed from the needle of our compass, and yet the impulse of motion towards the pole always finds again its right direction, whatever external powerful influence may endeavour to interrupt it; the same thing takes place in reference to the impulse of instinct, which has its origin from a power, before whose might the distances of space and of time are as nothing.

Thus the compass, with which the seaman ventures boldly upon the great deep, gives us, in its little measure, an image not only of our globe and its polarity, but also of the general arrangement of all the being and life of the created world. As the creation only is and continues through the influence of a forming, ordering, and upholding Creator, so every single thing is and continues only through the creative power which dwells in its being, and every one thing represents in itself the opposition between a creating and a created; every one of the myriads of beings is a compass, whose beginning and end continually point each to one and the same point. But this one right point, to which all the being and life of things turns, is God, who has made us and all things, and works through all with his Almighty word.

III.—THE IMPULSE OF THE MIND TO WANDER FORTH.

THE companions of the great Columbus were not to be blamed when, upon their bold voyage in the midst of the Atlantic ocean, just where it is the broadest, they gave themselves to anxiety and fear. Their

confidence and their hopes went not much beyond what their eyes saw ; their thoughts and imaginings were not directed to the achievement of a bold deed, to the attainment of a high intellectual aim, but to a speedy acquisition of riches, to sensual enjoyment, to bodily well-being. The eastern shores of India, the land of gold, they hoped to reach, there to enrich themselves with pearls and precious stones, to revel for a time amid the fruits and natural gifts of the land, and then to return home and enjoy in peace their treasures. But now, when they saw themselves in their crazy vessels in the midst of the sea, when the trade-wind from the east caught their sails and so hastened their voyage over the boundless expanse of waters towards the west, that they would soon be many hundreds of leagues from their country, when the hope of land, which the appearance of sea-birds and single strips of green seaweed had excited, still remained unfulfilled, and more than a month passed and the wished-for land appeared not, their confidence was so prostrated they thought only of returning, and only the unshaken firmness of their leader could suppress the outbreak of open mutiny.

Here the flesh rose against the spirit, for while his companions saw only with the eyes of the flesh, and lusted and hoped only with the heart of flesh, the great Columbus, with the eye of the spirit, descried far over the waters the goal of the voyage, which was hidden from the others. He had a surer guide than the compass, the strong trust of a pious heart in God's favour and help, in an enterprise which was destined to attest the irresistible impulse of the human mind to investigate the unknown, and to spread the light from the east over the darkness of the western hemisphere. That which filled his associates with dread, the speed with which, by winds and waves, the voyage was extended over more than nine hundred German miles—that inspired him with joy and strengthened his spirit; for his thoughts were not backward but forward, hence the favourable wind led him on like a messenger from Heaven ; his firm hope rested already on the land which his eye had never seen, and from which no tidings had yet reached him or his companions.

The flocks of swallows pass from the north-western coast of Europe, almost by

the same broad path over the sea, and not one of them on this great journey is seized with despair, not one is disposed to turn back, because in all a true force rules which fastens its guiding thread at one end to the distant, as yet unreached goal, and holds it there as strongly as to the home just forsaken, to which the other end is bound. The force of instinct everywhere appears as a search which is led astray by no obstruction, because that towards which the outward nature of the animal moves, has already become in its inner nature an object of enjoyment, akin, according to its measure, to the enjoyment with which hope inspires us human beings.

There is a migratory impulse of a much higher and mightier kind than that which leads the bird over the ocean, or the insect from one element and sphere of life into another—an impulse which leads the soul that it moves, not only from one end of the earth to another, but above the moon and stars, beyond the boundaries of the visible immensity into an invisible world of the spiritual and eternal. This migratory impulse dwells in the spirit of man, it is an impulse toward an orderly knowledge, an understanding of the connexion of visible things with one another, and especially of their meaning in relation to us ; an impulse towards the investigation of the invisible origin and end of our own being, towards acquaintance with other human minds, as well as an inward longing after spiritual association with them in the way of wisdom and knowledge. At the foundation of this moving force rests a hope, stronger than that which animated Columbus on his voyage, a hope that extends beyond the grave into an eternal life, and whose anchor rests on a ground which remains firm amidst all storms.

To the force of animal instinct the bodily limbs are given as its tools ; the migratory bird has his quick-moving wings ; the diligent bee those basket-shaped additions to its feet in which the blossom-dust is collected and carried ; the beaver his chisel-like teeth for the cutting of the trunks and branches of trees, and his trowel-formed tail ; the spider, the glands from which the viscous fluid comes, which hardens in the air to a thread. Instinct stirs itself oftentimes before the bodily implements through which it afterwards announces itself are

fully fashioned; the young goat tries to butt ere he has horns; a little crocodile, just from the egg, instantly endeavoured, in fore-feeling of its future strength, to bite a stick which was held to it. The soul, besides, precedes the body, and the latter becomes only gradually subjected to the efforts of the former; on this account even instinct awakes before it is fully furnished with the means of expressing itself.

In general the peculiar privileges which animals have over plants, viz., the faculty of sensuous perception and voluntary motion, depends upon the possession of organs of sense, and above all of sight and hearing, as well as moving muscles; the farther the eye of an animal sees, the farther it can move, as a general rule; the greater the strength of its limbs and the command it has over them, the more decisive is its destination to overpower other animals, and to feed itself on their flesh.

In man all the organs of sense are fashioned in such proportion, the limbs are so perfectly moveable, that his body becomes thereby a most perfect instrument of the all-investigating spirit and intelligent will. His eye beholds all the beauties of the Creation, whose harmonious sounds his ear perceives; his hand, with its cunningly working fingers, imitates everything which his eye beholds, and gives to a dead instrument a power of tone, by which it rivals all the melodies of birds, and the human voice itself. To the inward impulse of human nature towards a knowledge of the works of God, and to an exercise of its powers in harmony with the divine order of the world, is united a body with all its limbs and powers perfectly corresponding. Nevertheless, we can here plainly perceive that the inner spiritual power, with its impulses towards intelligent understanding and activity, comes not from the perishable body and the arrangement of its parts, but that this power belongs to the spirit, and is one with its essence. For this reason it exists, and the impulses dwelling therein manifest themselves, even when the condition of the body is unfavourable to its activity, and in a high degree obstructive; and we may thereby see that the spirit will continue, when the body is no more, even as it is active before the body exists. We will endeavour to illustrate this by an example.

In Hanover, in the State of New Hampshire, (U. S. A.) in the year 1829, was born Laura Bridgman, the daughter of respectable parents, whose case shows, as in many instances of the blind, that the human spirit remains the same in its powers and indications even when the avenues of external knowledge, the higher senses, are entirely closed to it. Until she was twenty months old, Laura seemed to be on the brink of the grave, for almost from her birth she suffered from violent convulsions, and was in all respects very feeble. Not until she was twenty-one months old did she gain any strength; before the end of her second year she had learned to speak some words. But this apparent bodily improvement was only the commencement of still greater suffering. The internal disease, which previously affecting the very springs of life, had produced those dangerous convulsions, ceased to affect the brain, and fell upon the organs of sight and of hearing, which were wholly destroyed; the life of the child was saved, but Laura was from that time entirely blind and deaf, and, as it afterwards appeared, deprived also of the sense of smell and of taste, for it was found that she was unable to distinguish rhubarb from tea. The poor child's life was preserved that she might teach others that there is in them another being and life than that of this changing perishable flesh.

During her last severe illness and for a short time afterwards, Laura still spoke some of the words she had learned; but as she no longer heard her own voice, she soon became entirely dumb. She gained strength slowly, and only at the beginning of her fifth year was she, apart from the loss of her senses, to be called perfectly well. But scarcely had she attained to health, when the mind of the child, inwardly richly endowed, but outwardly so impoverished, announced itself, with all its inborn powers and efforts, in a manner as evident as if nothing had happened that could injure it from without. Immediately there appeared, in the same strength as in intelligent children with sound organs of sense, the instinct toward knowledge, and the same curiosity. Laura began to run eagerly about the house and to examine all objects with her hands. In particular she followed her mother at every step, endea-

voured with her hands to understand what her mother was doing when the latter was busy, carefully imitated her, and in this way learned several female employments. Like other girls of her age, she understood how to play with dolls and other objects of childish amusement; but her delight was the greatest when she had learned anything new, or discovered the use of any object, or the purpose of any labour.

In the commencement of her ninth year, (1837,) Laura went to Boston, to the Blind Institution, under the care of its excellent principal, Dr. Howe. When the child felt herself at once separated from her most devoted and dearest friend and nurse, among strangers, and in a strange place, she was for a time timid and embarrassed, but it was manifest, even in these circumstances, that the deepest, inmost impulse of our being, existing in the very essence of the mind, is mightier than the longings of our bodily nature. The craving to know and to inquire, found in its new surroundings, increased nourishment; the thirst for spiritual fellowship was much more abundantly met than in the paternal home; the little creature, therefore, was soon as happy, or even happier in her new abode than at home. When the lively, intelligent child, as gentle and caressing as a lamb, was approached by all the inmates of the Institution with love, and when her blind foster-sisters played with her, when even Dr. Howe, on one occasion, played with her, and made believe that her doll was sick, and that he was its nurse, feeling its pulse, and laying a plaster on its wooden head, then she laughed and leaped for joy.

The child, so much pitied by others, nevertheless how happy was she in herself, how cheerful and serene! She knew that she was destitute of what others possessed, but at the same time she felt that she still possessed what is more than the outward senses, and which put her on a level with all others; she was happy in the activity of an inquiring mind, and in the love of other human beings. She soon became so well acquainted with her new residence, that she ran up and down stairs like a seeing child, and distinguished all the forty inmates of the house by the touch. At table, as on every other occasion, she bore herself with a propriety which was not

learned from seeing the example of others, but which came from within; she dressed and undressed herself without assistance, and manifested, in the braiding of her hair, the love peculiar to her sex, of neatness and ornament; in the female employments of embroidery, knitting and sewing, she showed as much industry and skill as her companions who, though blind, could yet hear. Thus was she in the most favourable element for the development of the impulses of our interior nature, and it suited her well.

But in the midst of intellectual excitements, the germs of natural love and grateful dependence towards her first protector, her mother, were not destroyed, but they grew with her spiritual development, and became ever more powerful and more elevated. About six months after Laura's entrance into the Blind Institution, she received a visit from her mother. The little deaf, dumb, and blind girl's recollection of persons had been overlaid with so many new impressions that she did not recognise her mother in her probably strange clothes, although she felt inquiringly of her hands and dress. She soon turned away as from a stranger, and even resisted the caresses of her mother, although a well known string of beads, which the child had worn at home, and which her mother had brought with her, gave her great pleasure; and she intimated to Dr. Howe, when she received them, that they came from her home. The mother next put into her hands another well known object from the paternal dwelling. Laura was greatly moved, examined her mother more closely, and gave Dr. Howe to understand that the lady certainly came from Hanover; permitted herself to be caressed by the stranger, and then again went away from her. Her mother, painfully affected, again approached her, and then all at once the force of filial love awoke with all its recollections; she felt very eagerly the hands of the supposed stranger, soon became pale and then red, and when her mother drew her to her, all doubt vanished, she threw herself with the liveliest expressions of delight in the arms of her mother, and left her no more; neither of her playthings nor of her playmates did she take any further notice.

The spiritual life, struggling within her to unfold itself, showed itself most de-

cisively in relation to the maternal visit. When her mother was about to leave her again, the child accompanied her to the door, holding her fast, felt round with her free hand to ascertain whether any one were near, and when she discovered that one of her best loved teachers was present, she seized her hand, once more pressed her mother close to her heart, then let her go, and threw herself sobbing into the arms of the teacher.

That, as we have said, those natural affections which belong rather to the animal nature, were by no means weakened by the growth of the higher faculties, but only elevated, and by the spiritual element which they received, only rendered the more strong, became most strikingly evident in Laura, when she had learned to express herself, not indeed by sounds, but by signs addressed to the sense of touch, in a language of the thoughts made perceptible in written letters. With the gift of language grew also the power of recollecting persons and things of the external world; the expression of love and aversion became better defined. So soon as she had learned to form words with her fingers, her mother and her desire for her, became a more frequent subject of conversation; her first letter was written to her mother; and when by chance the female teacher whom she loved, caressed any one of the other blind children, which perhaps stirred a little jealousy in the poor, love-desiring Laura, then her little fingers would say, "My mother will love me."

(To be continued.)

DEATH A LEVELLER.—It is very singular how the fact of a man's death often seems to give people a truer idea of his character, whether for good or for evil, than they have ever possessed while he was living and acting among men. Death is so genuine a fact that it excludes falsehood, or betrays its emptiness; it is a touchstone that proves the gold, and dishonours the baser metal. Could the departed, whoever he may be, return in a week after his decease, he would almost invariably find himself at a higher or a lower point than he has formerly occupied on the scale of public appreciation.—*Hawthorne.*

EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE EIGHTEENTH.

VISIT TO THE DEAD SEA—PREPARATIONS FOR THE JOURNEY—CONVENT OF MAR ELYAS—HOUSE OF SIMEON THE JUST—TOMB OF RACHEL—RAMA—BETHLEHEM—VALE OF ESCHOL—POOLS OF SOLOMON—CAVE OF ADULLAM—HEBRON—CONVENT OF SANTA SABA—THE DEAD SEA; THE FIRST VIEW OF ITS WATERS; APPLES OF SODOM—SHORES OF THE DEAD SEA—ITS WATERS, GEOGRAPHICAL, GEOLOGICAL, AND HISTORICAL RELATIONS—RETURN TO JERUSALEM—FAREWELL TO PALESTINE.

"The desert and the forest lone and solemn,
May know in time the work of mortal hand,
There may arise the temple, tower, and column,
Where only waved the tree, or swept the sand."
L.E.L.

"I looked again—I saw a lonely shore, and a waste
Of dreary sand;—I heard the black seas roar,
And winds that rose and fell with fearful haste.
There was one scattered tree, by storm defaced,
Round which the sea-birds wheeled with screaming cry.
Ere long came on a traveller, slowly paced;
Now east, then west, he turned with curious eye,
Like one perplexed with an uncertainty."
HOWITT.

WHAT with the bustle of getting the horses ready, and all the little *et ceteras* necessary for a journey to the Dead Sea, including some tobacco to keep the Bedouins in a good temper, and "something snug" for the Sheiks, and a few eggs to float upon its waters, and a lot of things that everybody said we should want, and which we were always wishing everybody had never said a word about, I really was quite in a glow, although the morning was raw, and Abdallah had made the coffee at least two hours before it was wanted.

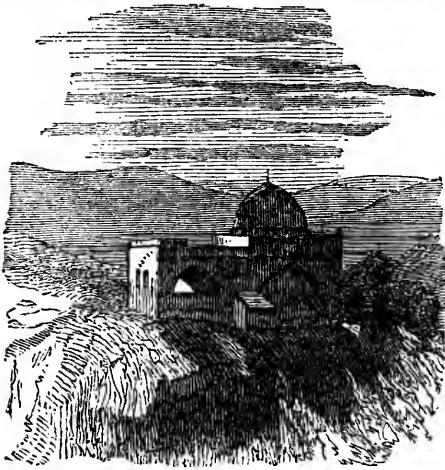
Now, really, it is no joke getting up a private expedition to the Dead Sea, for some want to do this, and others to do that; some to go one way, and the rest to go another, that the unfortunate caterer of the party—I had that honourable post—is almost driven crazy.

At last all our party were mustered: everybody had everything he wanted for the journey, and the Sheikh having given the word, eight Englishmen, two Prussians, four Arabs, and seven Bedauwi rode from

the city of Jerusalem at seven o'clock in the morning, and were soon on the road to Bethlehem, having crossed the valley of Hinnom, and passed along the plain of Rephaim.

In about an hour and a half after we rode through the Jaffa gate of the "Holy City," we were standing before the Greek convent of Mâr Elyâs, near to which is a well, said to be the one in which the star appeared to the eastern magi. The view from the convent is very fine, commanding the Zion portion of the "Holy City," and the hills round about her. To the westward of the road, upon a slope, is an old ruined tower, called the house of Simeon the Just, who, when he met the infant Saviour, exclaimed, "Lord, now lettest thou thy servant depart in peace, according to thy word: for mine eyes have seen thy salvation." *

There are two roads from the Convent of Mâr Elyâs leading to Bethlehem, and as



the one to the right passed close by Rachel's Tomb, we preferred it to the other.

The tomb lies in a valley, and is kept in order by the Moslems. It is a small square building, resembling the tomb of an Arab Santon, being surmounted by a dome, and is said to cover the spot where Rachel, the wife of Jacob and mother of Joseph, and Benjamin was interred. It is almost needless to say that the building is modern, having been erected within the last eleven hundred years, before which there was a pyramid of stones, possibly the

remains of the pillar Jacob placed upon her grave, which, we are told, was "in the way to Ephrath, which is Bethlehem."* It looks somewhat picturesque and lonely in the valley surrounded by Moslem tombs, its white dome contrasting with the dark mountains and scanty shrubs around.

Afar off to the westward is the village of Rama, where of old there was "a voice heard: lamentation and weeping, and great mourning, Rachel weeping for her children, and would not be comforted, because they are not." Now it is almost deserted, a poor and miserable village, mourning, as it were, amid the remains of its former greatness. The ruined buildings, from whence the strains of music and songs of praise resounded, are now mouldering fast.

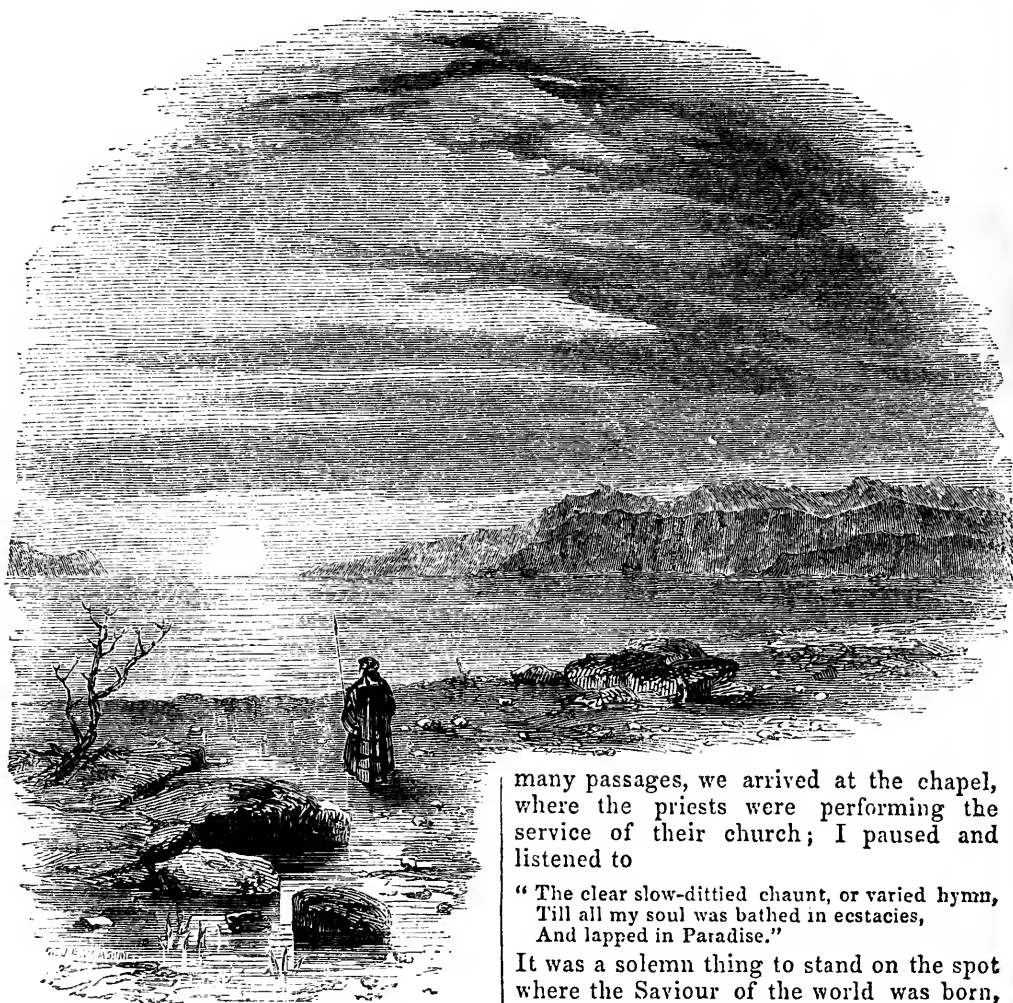
"The harp is broke, the song is fled,
The voice is hush'd, the bard is dead."

We wended our way through the dusty roads, with a fierce sun pouring his rays upon us, and no refreshing breeze to cool our scorched faces. By-and-bye the scenery became more pleasing: luxuriant vines clambered over stone fences, and a few silver-leaved olive-trees, shading the dusty road, relieved the landscape; then we saw fields of wavy corn in the valleys below us; and here and there clusters of fig and olive-trees, and dark, towering cypresses. A few paces more, we have turned the corner of the road, and the village of Bethlehem, with its high walls and embattlements, standing upon the summit of a terrace-cultivated hill, bursts upon us.

"*Rouhh! Yallah!*" shouts the sheik; and our party trot past the camels that are crawling along the rugged pathway. "*Tait!*" (good), we have passed under the pointed archway of the gate, and are now within the town, surrounded by the crowd of people ready to welcome our troop, and offering for sale amulets, crosses, bowls, cups, and other things, manufactured from the fetid limestone of the Dead Sea, and boxes, beads, and crucifixes, of mother-of-pearl, carved with more labour than ingenuity or taste. The town of Bethlehem contains about 3000 inhabitants, who gain a living chiefly by agriculture and the manufacture of the articles mentioned above. They are a quarrelsome set of people, and have not a prepossessing appearance.

* Luke ii. 28—30.

* Gen. xxxv. 19, 20.



Passing through the crowd, and leaving the town, we proceeded at once to the Latin Convent, built by the Empress Helena, but left unfinished, (at least according to the original plan), for want of the necessary funds. It is a large building, with massive, high, and embattled walls like a fortress, covering a great space, and standing on the brow of the hill. The original gate is partly walled up, and a low and narrow door left for the entrance of pilgrims, but too small to admit of the lawless Arabs riding into the court within. As we entered this roofed court or ante-chamber to the convent, we heard the distant pealing of an organ evidently played by a first-rate musician. Following a lay-brother through a great

many passages, we arrived at the chapel, where the priests were performing the service of their church; I paused and listened to

"The clear slow-dittied chaunt, or varied hymn,
Till all my soul was bathed in ecstasies,
And lapped in Paradise."

It was a solemn thing to stand on the spot where the Saviour of the world was born, and listen to the sacred sounds of that organ, and the voices of the priests raised in praise of the Redeemer. The part where we stood was adorned with some excellent paintings of the Spanish and Italian schools, which were much prized by the priests. One of them represented the presentation of the infant Jesus to the Magi, a perfect *chef d'œuvre* in the Paul Veronese style, but although I could distinguish the date of 1702, the name of the painter was illegible.

The convent monopolised all our time in Bethlehem, as it contained nearly everything that is interesting in the village. A priest having conducted us to the chapel of St. Catherine, and furnished each of us with a lighted taper, we descended a flight of steps leading into a subterraneous

grotto. A small chamber cut in the rock, with a rude pillar supporting its roof, was shown to us at the bottom of the stairs, as the sepulchre of the babes that were slain in Bethlehem by order of Herod; a small altar is placed over the pit into which the bodies were thrown. A few paces further, we were shown the spot where Joseph sat when our Saviour was born, and where the Magi presented their offerings; an altar is erected to mark this place. A dark narrow passage leads to the Chapel of the Nativity, which is about forty feet long, and eleven feet wide. The roof is rough and blackened by the smoke from fourteen lamps, that pour their softening light upon all around; they have been presented by Christian potentates, and are kept burning night and day. At the eastern end of the grotto there is an altar placed against the side of the rock, and in front of it a circle of agate and jasper, surrounded with a silver glory, and encircled by the words "*Hic de Virgine Maria Jesus Christus natus est.*"* This appears to attract many of the devotees, who are told that this is the spot where the star which went before the Magi rested. Near to this gate is a very remarkable curiosity, the manger where our Saviour was laid! On inquiry, however, we learn that the low stone trough now shown is *not the real manger*, which was removed to Rome during the Pontificate of Sixtus Quintus. Over the altar which accompanies it, is a good painting, representing the stable, and five lamps are placed behind an iron railing and kept constantly burning.

We now returned towards the Chapel of the Innocents, and entered a chamber hewn out of the rock, immediately in front of it. Here we saw the altars erected over the tombs of the Roman matron Paola, and her daughter Eutachia; the tomb of St. Jerome, and the cell in which it is said he studied the Scriptures for fifty years, and prepared the translation in Latin, known as the Vulgate; and close by is the tomb of Eusebius, who assisted St. Jerome in his undertaking.

Having seen enough of the curiosities and sights below, we ascended the stairs and proceeded at once to examine the

larger or upper church, called *Santa Maria di Bethlehem*, which is built in the form of a Latin cross. It is a handsome church, but is in a very dilapidated state. From the church we proceeded to the Chamber of Antiquities, where the priest-guide showed us, among several other curiosities (?), the arms of the innocents massacred by order of Herod; and what he termed a tongue, also belonging to an innocent!!

Our curiosity was now fully gratified, and being hungry we repaired to the refectory, and did ample justice to the viands placed before us by the Sacristans, then, presenting him with some money for the poor of the convent, we mounted our steeds, and rode forth from the village towards Hebron. After riding for about half a mile, we entered a narrow rocky valley, enclosed by steep hills, which is watered by a silvery rivulet, winding amid the vineyards and orchards, filled with ripe and tempting fruit. This, we were informed, was the vale of Eschol, where the spies sent by Moses obtained the large bunch of grapes they bare between them to Kadesh. A short ride brought us to an old Saracenic fortress, beneath which, a short distance to the north-west, are the Pools of Solomon; the three reservoirs which formerly assisted in supplying Jerusalem with water. They are so arranged on the sloping ground, that the water can descend from the first into the second, and from that into the lowest reservoir; they measure about 270 feet in breadth, and are about 660, 600, and 480 feet in length respectively, and communicate with an aqueduct, that conveyed the water to Jerusalem.

As we were pressed for time, we now pushed on for Hebron at a gallop, passing the Cave of Adullam, in which David hid himself; and then we entered upon a more interesting kind of scenery, the hills being studded with olive, sycamore, and fir-trees, mingled with dwarf and flowering shrubs, vineyards, and watch-towers. Some peasant girls, bearing their pitchers of water, some shepherds driving home their flocks, or a distant caravan, filled up the otherwise deserted roads.

Circumstances obliged us to return immediately to Jerusalem, without even visiting Hebron, and to proceed by another route, one more generally taken, and,

* Here Jesus Christ was born of the Virgin Mary.

perhaps, far more agreeable. As soon, therefore, as our affairs were again arranged, we proceeded along the dry bed of the brook Kedron towards Mar Saba, amid a dreary, yet grand kind of scenery, which became more wild and gloomy as we approached the convent of Santa Saba, which we entered about five hours after we had started from Jerusalem. The monks received us with a heartiness that we little expected; but our stay was of short duration. We slept there the night, and at three o'clock in the morning were winding along the wild and gloomy road among the picturesque mountains of Engedi. At length the waters of that gloomy sea appeared in the distance, and we all pushed on as fast as the steep and uneven road would allow us.

We had read all sorts of extraordinary stories connected with this sea, and were full of conjectures respecting its peculiarities. Some said that no living creature could exist near to it; others, that birds flying over it dropped down dead, and, in fact, all that was true and wonderful, untrue and impossible, were stated and commented upon, during our ride to its shores. On our road, we saw and procured some of the famous apples which grow

"Near that bituminous lake where Sodom stood," and which are said to

"tempt the eye,
But turn to ashes on the lips."

They look like a small orange externally, and some of them that were dried and shrivelled sounded as if filled with sand when we shook them. On pressing them, they burst like a puff-ball, and left only the rind and a few shreds in our hands.

At length we halted upon its pebbled shores, strewn with pieces of wood, branches of trees, and fragments of blackened rocks, that gave a sad and unnatural aspect to the whole scene.

This lake has received various names. In the Scriptures we find it called the "Sea of the plain;"* the "salt sea;"† the "salt sea eastward;‡ and the "east sea."|| The Greek and Roman writers frequently mention it as the "Lake

Asphaltites," (λίμνην Ασφαλτιτιν) and the Dead Sea (*mare mortuum*). It has been called in more modern times the "bituminous lake," the "sea of Sodom," and the "sea of the desert." The natives of the country call it *Bahr Luth* or *Lút* (the sea of Lot); *Bahr el Mont* (the Dead Sea); and sometimes *Bahr Mutneh* (the stinking sea).

Josephus estimated the length at 72½, and its breadth at 18½, Roman miles;* and Diodorus Siculus nearly agrees with him; but it is almost needless to state that this estimate is not correct. Dr. Robinson reckons its length at 50, and its breadth at 12 English statute miles, which is generally admitted to be pretty accurate. The depth of this lake varies considerably. Molyneux sounded to the depth of 225 fathoms (1350 feet) in the northern part, without ascertaining that the lead had reached the bottom. It was ascertained by the United States Expedition, under the command of Lieutenant Lynch, that the part of the sea to the north of the peninsula is deep, and that which lies southward of it is shallow. In the former, the soundings, which were very extensive and exact, show a depth of 116, 173, 177½, 218, 184, and 195 fathoms; in the latter, the soundings suddenly decrease to 3, 2½, 1½, and 1 fathoms; and at the extreme south, between Usdum and Sâfieh to half a foot. It therefore appears that the bottom of this sea consists of two submerged plains, one elevated and lying about 13 feet below the surface, the other depressed and averaging about 1300 feet below the surface.

The grim mountains of Moab rise to about 2,000 feet above and from the verge of the sea on the east, forming one of its boundaries, and the western shores are girt by part of the hills of Judea, which rise to about 1,500 feet above the sea. Both these ranges are intersected by numerous gorges, down which the mountain torrents rush wildly along,

"with a fearful sound,
Leaping o'er rocks with a giant's bound,"

depositing gravel, mud, and sand on the shores of the "Salt Sea" below, where they form innumerable small deltas. The

* Deut. iii. 17; iv. 49.

† Deut. iii. 17; Josh. xv. 5.

‡ Numb. xxxiv. 3.

|| Ezek. lxvii. 18. Joel ii. 20.

* A Roman mile is equivalent to 1614 English yards, or very nearly eleven-twelfths of an English statute mile.

western shores in some parts are covered with large boulders of conglomerates, blanched by the sun, and encrusted with salt, contrasting strongly with the scorched and brown hills that form its boundary, and the slimy mud deposited along its margin. On the eastern margin of the sea, near the Wady-el-Môjeb or River Arnon, the huge boulders of trap and tufa seem to vie, in the intensity of their sombreness, with the arid hills that tower above them, looking like a vast heap of volcanic ashes: the whole forming a strong contrast to the yellow mud of the delta at the mouth of the Arnon, and the waters of the lake itself.

The exact level of the surface of the Dead Sea has frequently been disputed within the last few years; but it has now been decided. In March, 1838, Messrs. Moore and Beke first observed the level of this sea to be considerably below that of the Mediterranean, by means of the boiling point of water; and, from various barometrical and thermometrical observations, they inferred that its surface was about 500 feet below the level of the Mediterranean.* A few months afterwards Professor Schubert made some barometrical observations, which led him to conclude that its depression was 598·5 Paris feet;† whilst Messrs. Russegger and Berton, in 1838, made the depression nearly 1,400 feet below the Mediterranean, by barometrical observations.‡ We are indebted to Lieutenant Symonds, of the Royal Engineers, for deciding this contested point by trigonometrical observations. This officer, after surveying two different routes, ascertained the level of the Dead Sea to be 1337 feet below that of the Mediterranean. It is said that the level varies from 10 to 12 feet at times, being raised during the rainy season by the influx of the Jordan, the mountain torrents, and other streams, and lowered during the hot season by evaporation.

The mountains around the sea are chiefly limestone, with occasional strata of flint or coarse agate, projecting a little from the surface; but at Usdum, which is towards

its southern extremity, there is a ridge about nine miles long, uneven and very rugged, varying from 100 to 150 feet in height, composed wholly of rock salt, with layers of chalky limestone. The salt is intensely bitter, and has a dark, dirty appearance. Dr. Robinson and his party discovered a cavern terminating in a gallery, which extended nearly four hundred feet into this ridge, the floor, sides, and roof, being composed of salt; a rapid stream of water passing along the bottom. The United States expedition under Lieut. Lynch, discovered a pillar of salt, capped with carbonate of lime, cylindrical in front, and pyramidal behind, on the eastern side of Usdum, about one-third of the distance from the north end of the ridge of salt. This pillar was about forty-three feet high, resting on a kind of oval pedestal, from forty to sixty feet above the level of the sea, and the peculiar shape is supposed to be caused by the winter rains.

In some parts of the northern extremity of the sea there is a black shining stone, which partially ignites in the fire, emitting a smell like bitumen, and leaving a whitish kind of stone behind, and if friction is employed, the same odour is perceptible on account of its being strongly impregnated with sulphuretted hydrogen; it is the "stink stone" described by Buckhardt, Maundrell, Pocock, and others. This fetid igneous limestone is called by the natives "*Hagiari Mousa*," or "the stone of Moses," and is probably the stone that Josephus says "is cast up at certain times of the year, and cannot bear the touch of blood." As it is capable of being polished, it is made into cups, bowls, amulets, rosaries, &c. Sulphur and nitre have been picked up in some parts; the former in the northern, and the latter on the southern shores; and also bitumen, or asphaltum, which is sometimes called Jews' pitch; it is said to be thrown up in a liquid form from the bottom of the lake, and afterwards hardened by the heat of the sun; but the natives say that it is seldom found in large quantities in the sea, although several thousand pounds of it were obtained by them after the earthquake of 1837. The general opinion as to the source of the bitumen, appears to be the existence of active volcanos under the lake, which, at certain periods pour out their contents, and

* Journal of the Royal Geographical Society, vol. vii. p. 456; v. ix. p. 64.

† *Allgemeine Zeitung*. Nos. 83 and 109. This is the talented author whose work we commenced publishing at p. 249.

‡ Bergham's *Almanack* for 1840, p. 481.

thus contribute to preserve to the water its peculiar properties.

Dr. Shaw calculated that the Jordan sends into the Dead Sea six millions and ninety thousand tons of water every year, and yet there is scarcely any visible increase or diminution of the height of its waters.

Several of us bathed in the sea, and endeavoured to swim, but such was the extraordinary buoyancy of its waters, that I found myself kicking my legs fruitlessly in the air, and throwing water over my head, a feat that soon made me terminate the performance, as my eyes, nose, and mouth had received such a dosing that I was half mad with the pain caused by the acridity of the waters, and my hair was sticking out "like quills upon the fretful porcupine," in consequence of its incrustation with salt. How any one could remain in its waters, picking a fowl, loading and firing a pistol, or writing a letter! is a mystery to me, for that bathe in the Dead Sea gave me a week's pain, and the thought of it, even now, makes me tingle as if I had the prickly heat.

Its waters are intolerably salt, bitter, and nauseous, and as the analysis of them is interesting, I subjoin those made by Dr. Marcet, in 1807, and Dr. Apjohn, in 1839:—

<i>Ingredients.</i>	<i>Marcet.</i>	<i>Apjohn.</i>
Specific Gravity.....	1211	1153
Boiling Point.....	—	221° F.
Chloride of Magnesium	10·246	7·370
" Calcium.....	3·920	2·438
" Sodium.....	10·360	7·839
" Potassium.....	—	0·852
" Manganese	—	0·005
Sulphate of Lime	0·054	0·075
Bromide of Magnesium	—	0·201
	24·580	18·780
Water	75·420	81·220
	100	100

The water analyzed by Dr. Apjohn was taken half a mile from the mouth of the Jordan, in the rainy season; and his analysis does not give so great an amount of salts as those that were examined by other chemists; neither did he detect alumina or ammonia, discovered by Gmelin; nor iron, silica, and bitumen, by the Messrs. Herapath.

It was a solemn scene, that calm lake of heavy waters before us, bordered by barren hills and shores, devoid of life, and the stillness around, only broken by

"The surges distant moan;
All else is hush'd! so silent, so profound
As if some viewless power presiding round
With mystic spell, unbroken by a breath;
Had spread for ages the repose of death."

A sad landscape, uncheered by even a blade of grass, but

"Where desert grandeur frowns in pomp sublime,
For beneath those waters lie the damned cities
of the Plain."

In a few hours after we had gazed our last upon its waters, we were in Jerusalem settling with Abdallah for the escort; another hour found us galloping along the Jaffa road, and in six hours and a half after we left Jerusalem we were seated in a Jaffa café, enjoying ourselves after the fatiguing ride.

This was our last night in Palestine, a region of the world possessing the highest interest and therefore I could not help regretting that my stay had been so short; but the recollection of the visits to its many interesting sights are as vivid and pleasing now, as when they were entered in my journal; and though I would fain remain longer amid the places which from earliest childhood I had desired to visit, I am compelled to leave for another land, and to say to Palestine—farewell—a word that must be, and hath been—a sound which makes us linger;—yet—farewell!"*

* The analyses of the Dead Sea waters are as follows:—1. By Macquer, Lavoisier, and Le Sage, in Paris, (*Mém. de l'Acad. des Sciences*, 1778.) 2. By Dr. Marcet of London (*Philosoph. Trans.*, 1807). 3. By Klaproth of Berlin (*Berliner Mag.*, 1809.) 4. By Gay Lussac, of Paris (*Annales de Chimie et de Physique*, tom. xi. p. 197) in 1818. 5. By Harnstädt, of Berlin (*Schweiger's Journal*, vol. xxxiv. p. 153) in 1822. 6. By Gmelin, of Tübingen (*Poggendorff's Journal*, 1827, vol. ix. p. 177) in 1826. 7. By Vogel (*Annales de Chimie et de Physique*, tom. ii. p. 371.) 8. By Dr. Wm. Gregory (*Madden's Travels*, vol. ii. p. 352) in 1828. 9. By Dr. Apjohn, of Dublin, *Athenæum*, 15th June, 1839.) 10. By Messrs. J. C. Booth, and A. Muckle, (*Lynch's American Expedition*, p. 509), in 1849. 11. By the Messrs. Herapath of Bristol (*Edin. Philosoph. Journal*, for January—April, 1850). 12. By Malte Brun, (*Chateaubriand's Travels*.) As I have not got this work I am unable to give the date of analyzation. The last analysis made is that by the Messrs. Herapath.

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

THE MILITARY MAN.

As you have determined to make the army your profession, it is my duty to offer you such advice—the result of experience and reflection—that, if followed, will ensure you the lasting respect and esteem of every officer who possesses any zeal for the service.

I presume that you have received such an education as every gentleman about to enter the army requires; because, if you have not, there will be little probability of your passing the necessary examinations. You have, no doubt, heard that there are three grand institutions in this country for the education of gentlemen cadets: Sandhurst, for the British line; Woolwich, for the artillery and engineers; and Addiscombe for the Indian army, both line and artillery. Before obtaining admission into any of these establishments, it is necessary to pass a preparatory examination, and therefore it will be proper to inform you of the nature of them.

The age of admission for a cadet into the Royal Military Academy, Sandhurst, is from thirteen to fifteen years, and you will be required to write neatly, spell correctly, and construct an *English* sentence. You must also know the first four rules of *Arithmetic*, simple and compound; or arithmetic as high as Rule of Three, together with Vulgar and Decimal Fractions. Your knowledge of *Latin* will be tested by your ability to construe passages of *Cornelius Nepos*, or *Cæsar*, in prose, and *Virgil* or *Ovid*, in verse.

The age of admission for a cadet into the Royal Military Academy, Woolwich, is from fourteen to fifteen years and six months; and the examination is more difficult. You will be required to write a good legible hand, freely and correctly, from dictation in *English*. The *arithmetical* examination includes vulgar fractions, ratio and proportion, the rule of three and compound proportion, decimals, duodecimals, involution, the extraction of the square and cube root, and simple interest. Your knowledge of *Algebra* is

tested by requiring you to understand the notation and four fundamental operations of addition, subtraction, multiplication, and division; common multiples and common measures, fractions and simple equations; involution, evolution and the various operations on surd and imaginary quantities. The examination in *Geometry* includes the definitions, postulates, and axioms in the first book of *Euclid*, and problems in the two first books of *Euclid*. The *classical* examination is limited, as you are only required to construe and parse *Cæsar's Commentaries*. You will be required to read and write the printed and written characters of the *German* language, and to have a competent knowledge of the declension of the articles and personal pronouns, and of the conjugation of the auxiliary, active, and passive verbs. As *History* is indispensable to a military man, you will be examined as to your knowledge of English history, and general acquaintance with the leading points of ancient and modern history. You will be required to possess a knowledge of *Geography*, comprising a general knowledge of countries, their position, capitals, rivers, mountains, seas, population, character of inhabitants, &c. *Drawing* being very necessary, you will be required to copy an easy outline, and to *print* the ordinary Roman characters and italics.

If you are to be sent as a cadet to Addiscombe, it must be between the ages of fourteen and eighteen years inclusive; but, as the examination is not very severe, you will have no difficulty in entering the seminary. It is requisite that you should write a good legible hand, and a sentence in *English* from dictation, and you will be required to read and construe *Cæsar's Commentaries*, to show your proficiency in *Latin*. You will be required to possess a correct knowledge of all the rules of *Arithmetic*, especially the rule of three, compound proportion, practice, interest, vulgar and decimal fractions, and the extraction of the square root.

It is absolutely necessary that you should know all that I have enumerated; but do not be satisfied with this knowledge alone. Make yourself master of the remainder of arithmetic, the use of logarithms, the first five sections in geometry, the theory of proportion, and geometrical problems, and

the first part of Algebra. If you are able to draw outlines with a pencil, and shade with Indian ink, so much the better.

If you have chosen the Royal Marines, in preference to the other branches of the service, it will be proper to inform you that there are two methods of obtaining commissions in that corps. First, by passing an examination, and getting the commission of second lieutenant at once, being what is termed a "direct commission;" and secondly, by entering as a cadet on board the *Excellent* gunnery-ship, at Portsmouth. In the former case, your age must not be less than sixteen, or above twenty-one years, and it is also indispensable that your constitution be good, and your height not less than five feet four inches. You will be examined in *Arithmetic*, common and decimal; *Algebra*, as far as simple equations; the first four books of *Euclid*, and portions of books six and eleven; *Trigonometry*, theoretical and practical, its application to the determination of distances, heights, &c., mensuration of planes and solids, proof of rules in Trigonometry, and the use and construction of logarithms; and *Problems in Gunnery*. You will also be required to write *English* correctly from dictation. No candidate will be nominated as a cadet who is under fifteen or above nineteen years of age, and he must be prepared to pass such examinations as the Lords Commissioners of the Admiralty may deem fit to require. This generally consists of the first four rules of Arithmetic and Algebra, tables of weight, measure, and money, reduction, and rule of three, and being able to write correctly from dictation. Cadets are not allowed to remain more than two years on board the *Excellent*, unless they have passed their final examination, but they may receive their commissions after one year. Subsequent to their entry as marine cadets, they are required to pass examinations at the Royal Naval College every half-year or until such time as the Lords Commissioners of the Admiralty may grant them commissions. These examinations are—first half-year, Arithmetic; Algebra, up to simple equations; Euclid, books one and two. Second half-year, Arithmetic; Algebra, including simple and quadratic equations; Euclid's Elements, books one, two, three and four; proof of rules in Trigo-

nometry, and the construction of logarithmic tables. Third half-year, Arithmetic; Algebra; Euclid's Elements, books one, two, three, and four, and portions of books six and eleven; application of Trigonometry to the determination of heights, distances, &c., with the use of logarithmic tables. Fourth half-year, Arithmetic; Algebra; Euclid's Elements; Trigonometry, theoretical and practical; mensuration of planes and solids; problems in gunnery. Cadets are also required to be acquainted with French and History, and no cadet can receive his commission unless he is able to pass the required examination, together with the short course of theoretical and practical Gunnery now established in the *Excellent*, with a knowledge of the Great Gun exercise, the use of the Sextant, and a competent knowledge of Field Fortification and Mechanical Drawing. When cadets receive their commissions they are allowed to volunteer for the Marine Artillery; and, providing they have passed through the whole plan of instruction laid down for marine cadets in the *Excellent*, have passed a creditable examination, and can produce a certificate of good conduct from the captain of the *Excellent*, they will have no difficulty in being allowed to study at the Royal Naval College, prior to undergoing another examination for the commission in the Marine Artillery.

The examination for the Marine Artillery is more severe than for the other branch of the marine corps, comprising the Theory of Projectiles, Steam Engine, Field Fortifications, Mechanics, Hydrostatics and Pneumatics, Computation of Logarithms, Taylor's and Binomial Theorem, Conic Sections, Differential and Integral Calculus, among other subjects necessary for all officers to know. Commissions in the marine corps are obtained without purchase, and the officers take rank by seniority.

The examination for military commissions is not difficult, the candidate being required to write *English* from dictation, and to read it correctly; to know the first four rules (simple and compound) of *Arithmetic*, with proportion, fractions, the use of logarithms, and to have a competent knowledge of *Algebra*. He will be required to translate into English some *Latin* author, in prose or poetry, and to

parse, and show his acquaintance with grammar, syntax, and prosody; to translate a passage from a *French* work into English, and to state, in writing, the exact meaning of the author. If not acquainted with Latin, he must be able to translate a passage from an English work into French or German, and to state, in writing, in French or German, the exact meaning of the English author. He must also be master of the French or German grammar. He will be examined in *History*, and expected to answer questions on Hume and Smollett's *History of England*, and the histories of Rome, Greece, and Modern Europe. It is also desirable that he should possess a competent knowledge of *Ancient Geography*, of the modern divisions of the world, the name of the capital of each nation in Europe, the principal rivers, sea-ports, and military posts in Great Britain and Ireland, and of Her Majesty's dominions in every part of the world, and that he should have read some elementary work on fortification, and have received some instructions in drawing.

If you intend to pass in for a "direct commission"—that is, without receiving the military education of a cadet—it will be necessary to adopt a fixed plan for study, and be faithful in pursuing the plan laid down, learning to rest the mind rather by the variety of your reading, than by entire cessation from it.

It is obvious that a great many officers must enter the army without being able to avail themselves of the advantages of the education which our great military establishments offer; but that is no reason they should not be equally well informed; and therefore, if your family are unable to afford you such an education, you should study at home, for eighteen months, such works as I have classed below.

ENGLISH.—Exercises on the English Grammar (see English Grammar, vol. i. of the *Family Tutor*); Booth's Principles of English Composition; Walker's Pronouncing Dictionary; and selections from Bacon, Sprat, Addison, Drs. Middleton and Johnson, and Macauley, to be written from dictation.

ARITHMETIC.—Bonycastle's *Scholars' Guide to Arithmetic*; or Colenso's *Arithmetic*.

GEOMETRY.—Simpson's *Euclid*; Hav-

ter's *Practical Geometry*; Hutton's *Mathematics*,

ALGEBRA.—Colenso's *Algebra*.

SURVEYING.—Snowball's, Hall's, or Jean's *Trigonometry*; Hutton's *Logarithms*, and Haversine's; Templeton's *Millwrights' and Engineers' Pocket Companion*; Frome on *Trigonometrical Surveying*; Simm's *Treatise on Mathematical Instruments*; and, as levelling is an important branch of engineering, his work on *Levelling*.

DRAWING.—Hayter's *Practical Geometry*; Sopwith's *Isometrical Drawing*.

CLASSICS.—Cæsar's *Commentaries*; Ovid; Virgil; Horace; Xenophon; and the *Military Institutions of Vegetius*.

FRENCH.—Delille's *Répertoire Littéraire*; Charles XII.

GERMAN.—Lebahn's *German in one Volume*; and *Self-Instructor in German*.

HISTORY.—Hume and Smollett's *History of England*; Keightley's *Histories of Rome and Greece*; Allison's *History of Europe*; and the *Edinburgh Cabinet Library*—"British India."

GEOGRAPHY.—Butler's *Geography*; or Arrowsmith's *Grammar of Modern Geography*.

FORTIFICATION.—Straith, Jebb, and Macauley on *Fortification*; and the plates to Macauley's *Field Fortification*.

MILITARY JURISPRUDENCE.—Notes on *Military Law, &c.*, by the author of the *Artillerist's Manual* and *British Soldier's Compendium*; M'Arthur on *Courts-Martial*; Major-General Napier on *Military Law*; D'Aguiar's *Courts-Martial*, revised by J. Endle.

NATURAL PHILOSOPHY, &c.—Grandfather Whitehead's *Catechisms*; and Lardner on the *Steam Engine*.

The above works will also require to be studied after the candidate has obtained his commission, and then it will be advisable to add a few more:—viz., The *Aide-Memoire to the Military Sciences*; The *Three Arms, or Divisional Tactics of Decker*, by Major I. Jones; *Military Studies*, by Marshal Ney, edited by G. H. Caunter, and Major A. James; Gleig's *Lives of the Most Eminent British Military Commanders*; and *Military Finance*. I must also strongly recommend Carr's *Synopsis of Practical Philosophy*; and the following works are essentially necessary:

DRILL.—Sinnott's Military Catechism ; Doyle's Catechism ; The Military Manual, by Serjeant-Major Lewis, R.M. ; Mitchell on Light Drill ; The Artillerist's Manual, or British Soldier's Compendium ; and the Tabular Arrangement of Battalion Drill, by Captain Troubridge.

Do not be discouraged by the long list of books I have drawn up for you, because if you look among the books in your library, I have no doubt that you will see many of them. Remember that knowledge is power ; and therefore gather information from every source, and record it in a common-place-book ; for be assured that the more you exercise your mind, the greater will be your self-esteem.

As soon as you have passed your examinations and obtained a commission, do not throw aside your books to admire yourself before a glass in the gandy uniform of your regiment ; but rather endeavour to find pleasure in the society of the experienced officers of your corps and in reading, than in parading the streets in plain clothes, or, as it is commonly called, "mufti ;" lounging about the billiard-rooms and cigar divans ; driving tandems and dog-carts ; and such modes of "killing time," as officers usually resort to in garrison towns.

You are now about to enter upon the world, devoid of experience and almost before your mind is trained to thought. Beware, then, of the idle and dissolute that are met with in some regiments, ever ready to plunge you into extravagance and every kind of vice. The profession of a soldier requires talents and genius, great self-denial, close application and perseverance, moral control, obedience, and a strict sense of honour. It is not a path of luxury, strewn with flowers, but one of difficulty and toil ; therefore the honour is greater, and the end more glorious.

Remember that health is one of the greatest blessings to any one, especially to a soldier ; without it life is a burthen, therefore do not render yourself prematurely infirm by indulging in fashionable debaucheries and excesses, and thus close an inglorious life by a death even more disgraceful. I remember a young man in the same regiment as myself, whose prospects were as bright as those of any other officer, but who was obliged to resign his com-

mission six months after he obtained it, in consequence of his dissolute habits ; and three months afterwards he died of delirium tremens.

If you are nursed in the lap of luxury and ease, you will never make a soldier. Remember how the Lacedæmonian soldiers were trained. Charles the Twelfth, in the height of his glory, slept upon a bear-skin placed on two trusses of straw, upon which he lay down in his clothes, the same as the meanest soldier. It is not necessary that you should sleep upon a bed of hay or straw, like Suwarrow ; but, if your soldiers are subject to do so, set them the example yourself, rather than allow them to be disgusted by your effeminacy and want of self-denial. Remember that Cato threw away a helmet full of water, brought to him by one of his soldiers, in front of the whole army, because he would not quench his own thirst when his soldiers could not do the same. Here then was self-denial, and his army appreciated it, because he was contented to share their troubles and fortunes. If soldiers see officers well clothed, comfortably housed, and living luxuriously, while they are exposed to cold, hunger, thirst, and other hardships, they draw unfavourable comparisons.

Do not let your mind be always occupied by dress and jewellery. Every officer and gentleman should dress well, but neatly, and according to his means, avoiding singularity and profuseness ; for remember that it is said, "the fool is known by his pied coat." Soldiers lose confidence in an officer whose mind is wholly occupied with his personal appearance and dress, because they justly conclude that he can pay little attention to his duties. You remember the expression of Julius Cæsar, at the battle of Pharsalia ("Miles, faciem feri"*), when he ordered his soldiers to aim at the faces of the effeminate Romans : his conclusions were just, they fled for fear of being disfigured.

Remember that Franklin says, "he who rises late may trot all day, and not have overtaken his business at night." Perhaps you will say there is no occasion for you to rise early, that your profession does not require it ; but be assured that you are mistaken, and perhaps never more so than

* Soldiers strike at the face,

in the present instance. Let me remind you of the Duke of Wellington. Do you suppose that he is *now obliged to rise at six o'clock*? but he does, and invariably retires to rest early. The following old maxim should be hung up in your bed-room:—

“He that would thrive,
Must rise by five;
He that has thriven,
May lie till seven.”

Allow yourself seven or eight hours for rest, and you will be astonished what may be done before breakfast time. Never waste your time, but take advantage of every moment. Few men have so much time at their disposal as military men, and yet very few ever take advantage of the precious gift; for generally as soon as they obtain a commission they give themselves up to pleasure, and a continued round of gaiety.

Do not let self-conceit undermine your understanding, but when you commit a fault confess it. A certain amount of pride is natural and excusable; self-conceit, and pride of birth, riches, rank, personal appearance, and judgment, are to be despised. Modesty is a sure sign of merit, but an egotistical, boasting, arrogant, talkative man is an insufferable nuisance.

Courage is essential to a soldier, therefore acquire and cherish it; beware of cowardice, it accompanies effeminacy, indolence, and luxurious habits. If you discover that you are deficient in courage, withdraw from the army, for the want of it is the highest military crime; and by continuing in the profession of arms you will assuredly disgrace yourself sooner or later. I would have you remember that courage is the result of wisdom, of education, of reflection, and sometimes of misfortune; it is a virtue, a noble and sublime sentiment, that is necessary in every situation of life, and the parent of all virtues and heroic deeds: humanity, generosity, firmness, love of country, and intrepidity, all spring from it.

Do not confound bravery with courage, it is innate, we have it at our birth, and cannot acquire it by reflection or education; it is in our blood, and shows itself on certain occasions, and under peculiar circumstances—such as in the heat of battle, in the moment of danger, and from the impulse of example. Bravery should be coupled

with humanity and piety; the former moderates its excesses, the latter refines and gives it energy and solidity.

Valour is the union of courage and bravery, springing from the love of our duty, zeal for our country and sovereign, and desire of glory, and consists of bravery in action, and courageousness in every situation throughout life. Valour should be coupled with modesty, for self-satisfaction is preferable to popular applause; the one is permanent, the other transitory.

I cannot help saying a few words on the subject of duelling, a practice that should be strongly opposed. If you vanquish your adversary, what have you done? Is it a deed of valour to *murder* a fellow-creature? Is it heroic to *maim* your quondam friend for life? Is it humane, or friendly, or social, to cover your faults by an *affair of honour*? Dr. Johnson upholds the practice, because, he says, “He, then, who fights a duel, does not fight from passion against his antagonist, but out of self-defence; to avert the stigma of the world, and to prevent himself from being driven out of society;” but the widow and the fatherless do not see things in this light; they will tell you that it is your want of greatness of soul, of courage, of humanity, aye, and religion, that makes you imbue your hands with blood, and perhaps brand your name as a murderer; for an affair of *honour* (the very name is disgraced by its application), may terminate in murder: it is nothing else. In 1751, two military officers, who were stationed in the garrison of Dublin, quarrelled over their wine, about some ladies, and one of them sent a challenge the following morning to his companion, to which the latter returned the following answer:—“Sir, I reckon it my peculiar happiness that I can produce the officers and soldiers who witnessed my behaviour at Fontenoy, as evidences of my courage. You may endeavour, if you please, to propagate my refusing your challenge, and brand me with cowardice; but I am fully convinced that nobody will believe me guilty, and everybody will see that you are malicious. The cause in which we quarrelled was a trifle; the blood of a soldier should be reserved for a noble purpose. Love is blind, resentment mean, and taste capricious; and it ought to be considered, that murder, though palliated

by a false show of honour, is murder still, and calls for vengeance."

One thing I particularly wish to call your attention to—Courts-Martial. Attend all the courts that you can, so as to learn the duties of members of a regimental, a line, or a general court-martial, and study the books on martial law that I recommended. Make notes of peculiar cases, sentences, and evidences; and when your judgment is more matured, you will be better able to discharge the onerous duties of a member of a court-martial. I have seen young officers engaged, during the proceedings of a court, in drawing caricatures of the prisoner, and evidences; do not indulge in such a practice, for remember that you may be trifling with the honour, the happiness, or perhaps the life of a fellow-creature. What for? Why, the gratification to be derived from hearing half-a-dozen emancipated schoolboys exclaim, "Ah! ah! Jones is a fast fay-low!"

Endeavour to know all the men in your regiment—not only by name, but their characters, and let them see that you know them personally. It frequently stimulates the good, and checks the bad characters.

Let me impress upon you the necessity of economising your income, and being particular in the choice of your friends; an account-book will regulate the former, and prudence the latter. Never borrow or lend money. Pay for all you get as you have it. Avoid company, unless of the best.

I could tell you much more, but space does not permit, and in briefly summing up the qualities a soldier should possess, remember that I have no other motive than an anxious desire that you should prove an ornament to the profession you have chosen.

Be ready to learn, slow to speak, willing to obey (that is, if you aspire to command), and ever ready to forgive an injury. Respect truth, secrecy, and honour. Avoid drinking, gambling, vanity, and indulgence in your passions. Study tactics, particularly the manner of arranging troops. Practice humility, gentleness, prudence, humanity, affability, deference, perseverance, discipline, punctuality, and religion. Encourage modesty, greatness of soul, firmness of mind, and valour. Love your profession, and let your motto be—

"Honour all men; love the brotherhood.
Fear God; honour the Queen."

REVELATION AND SCIENCE.

BY THE REV G. R. CROOKS.

(Concluded from page 267.)

LET us now turn to the history of the creation, with which Revelation furnishes us. This account bears the impress of being fact: it is such as we would expect in the earliest records of our race, intelligible to a people, still in the rudiments of civilisation, and yet adapted to races in the highest stages of culture. It assures us, that in the beginning—at a dateless period, which no human mind can fix—God, not the idols of the heathen, created the heavens and the earth. The visible universe was not an emanation; not the spinning of the web out of the eternal spider; not a huge pile of fortuitously concurring atoms; not the result of chemical and mechanical laws, for which we can find no source or author, but the work of one living and true God.

If then we must reconcile the discoveries which science claims as true, and the divine word, which we know to be true, may we not assume that at an indefinitely long period after the first creative act, which originated the matter of the world, God prepared to fit up our globe for man? This supposition is confirmed by the fact that the narrative is exclusively occupied with the origination of man, and of the animal and vegetable creations, immediately related to him. We have described more prominently the origin of the grasses, herbs, and fruit-bearing trees, and of the "familiarily known, the visible, and useful, among the animals." According to this explanation, we may conceive, when we are told that "the earth was without form and void," that our globe, having passed through various changes, each involving a reduction of temperature, was left entirely in a chaotic state, and at this point, the Almighty began to arrange it, as we see it now for our enjoyment and use.

I could not wish for more than this first sentence of the Bible to prove the inspiration of the whole volume. It is more satisfactory than all the philosophies—I mean the metaphysical—Greek, Roman, French, and German put together. "While philosophy," says Dr. Harris, "was still breathing mist, and living in chaos, the opening sentence

of the Bible had been shining on the Hebrew mind for centuries, a ray direct from Heaven. "Nor has science been able to transcend that sublime affirmation. It is too spiritual for materialism to embrace; too personal and substantial for pantheism to dissipate. True, the narrative of the Adamic creation, which follows the primary announcement, wears a peculiar form; the spirit is clothed in mortal vesture, but the divine shines through. Science has had to recal her imputations on it, and to confess herself forestalled in her own department. Modern scepticism may be challenged to imagine a more creditable account of creation.

Well may we believe, that when the Almighty returned to his Sabbath's rest, after finishing and furnishing the earth for us, made in his image, "the sons of God shouted for joy;" that as they returned to his eternal house, over the

—"broad and ample road, whose dust is gold,
And pavement stars"—

Heaven resounded with praise; that then

—"the harp
Had work and rested not: the solemn pipe,
And dulcimer, all organs of sweet stop,
All sounds on fret by string or golden wire,
Temper'd soft tunings, intermix'd with voice,
Choral or unison."

For "God saw every thing that he had made, and behold it was very good."

2. It has been assumed that the earth was not created at all, but has always been as now, from eternity.

As the operations of Nature go on to-day, without any visible divine interference, it is asked, may it not be supposed that they have always, without beginning, been thus going on.

Now if science can show, that in the past history of our globe such changes have taken place, as cannot be conceived possible without divine interference, this assumption will be refuted.

(1.) All the laws of matter are such as indicate infinite intelligence. Science has reduced all the matter, which has been brought to its notice, to fifty-four or five elementary substances, and has demonstrated that they combine only in certain quantities, and according to fixed and invariable preferences. The smallest visible and tangible atom, if compounded, is compounded according to laws, which an infinite

intelligence alone could have established. The oldest known rock, granite, is crystalline in its structure; that is, its chemical constituents not only unite in fixed quantities, but at certain points, and thus make solids of certain shapes. There is no such thing, then, as a fortuitous concourse of atoms. The fifty-four elements have been beautifully called God's Alphabet, from which, by infinite combinations, he has produced the vast variety of the visible universe.

(2.) Geology shows that there was a point, in the past history of the world, when organic existence had not commenced. Whether its hypothesis, that the Earth's mass was once in a state of fusion, making the presence of life an impossibility, be accepted or not, the fact that we can come to a point where there are no more fossils, is sufficient for the purpose. The organic life of our earth can hardly be assumed then to run back eternally.

(3.) This same science asserts that there is indubitable evidence, that previously to the advent of man there have been several economies of life, which have successively passed away and been replaced by new ones. In the history of our globe, therefore, organic life has repeatedly come to an end: how could it be restored, especially under new forms, without the intervention of an Almighty Creator? This itself will confute the supposition, that all things have been from eternity, precisely as they are now. The history of man is an additional refutation of this assumption. In the great depository under our feet, of the remains of the living, his relics have not been found beneath the surface soil. He then cannot be referred to an infinite retroceding series.

3. Again, it has been argued, that man is the result of many progressions of animal life; that he is the limit of many efforts of nature to perfect her forms of sentient existence. Thus we are to suppose that birds were once fishes, that fishes were once invertebrate animals; in a word, that there has been a regular procession of the higher creatures out of the lower.

This theory is an abuse of the law of adaptation. To a certain extent plants and animals can conform themselves to an alteration of their circumstances. Some plants, we are told, when taken from a warm to a cold region, change their habits, so that they can endure the rigours of winter.

The dog, when carried to the frigid zone, will exchange his hair for wool, and when brought back to milder climes, resumes his hair again. But to infer from this that there can be a transmutation of species, is, to say the least, overstraining the matter. We cannot help feeling, when we hear this theory, like the man who found out one day that he had been talking prose all his life without knowing it. We are astonished to discover, that we have passed through so many transmigrations in order to become men. All pride of ancestry is plucked up by the roots. Instead of tracing our life-blood up to some noble parent-lake; instead of being able, even if we cannot assume to be shoots of royal stock, at least to claim relationship with Adam, who for all the harm he has done us, was a very respectable gentleman, we must seek our progenitors in reptiles and fishes, until at last we come to a vile, gaping oyster. Indeed, if we take this to be our line of descent, we must believe, that when in our progress we had come to be monkeys, we were decidedly getting up in the world. We had dropped paws and claws, and had reached the dignity of hands; and though we could not talk, we could at least chatter; and if we could not laugh, we could certainly grin; and though we were still troubled with a tail, we hoped to drop it, or at all events to transfer it to the head, and wear it as a long quene. What a reflection it is, too, that the descendants of the dogs and apes of the present generation, will be delivering lectures in some future Trinity Church, and be saying complacently to their audiences, what an enlightened people are we! The poet has told us that imagination might trace the noble dust of Alexander till we find it stopping a bung-hole. Now imagination is called upon to perform the reverse process, and to trace the clay that stops the beer-barrel—where it has doubtless absorbed some of the fermenting energy—till it steps before us an Alexander. Imagination is certainly competent to do mighty tasks; but this is certainly asking of it more than the labours of Hercules.

(1.) This theory assumes that the propensities of the animal have produced its organisation. Thus we are assured, that it is easy to conceive the metamorphosis of a winged fish, "flying sometimes through the water, and sometimes through the air,"

into a bird flying through the air always. By the effort to stand the two lower fins would become feet, and successive efforts would produce successive parts, fitting the transmuted creature to its new element. But it may be asked, where does the propensity originate? In nature all the elements of shape and organisation precede the manifestation of the propensities. "The larva of a winged insect can only walk: but if we take it and dissect it, just before its change is completed, we find an apparatus in progress for flight through the air."

2nd. Mr Miller very acutely remarks, that this theory confounds *gradation* with *progress*. There is a gradation of the members of the animal kingdom. They rise from Zoophytes and Molluscs, to vertebral animals; and in the vertebral line, from fish to reptiles, from reptiles to birds, from birds to mammals, or animals that suckle their young, at the head of which class stands Man. But this gradation does not imply progress in point of time. Were life progressive, as the development hypothesis assumes, we ought to find that the oldest fossil remains are those of animals of the simplest structure, and to see the steps of this stairway, which is to lead them to the culminating point of dignity and honour. But there are chasms in the ascent which transmutation cannot overleap. Take, for instance, the fishes. "They seem," says Mr. Miller, "to have been the master existences of five succeeding formations; ere the age of the reptiles began. Now, fishes differ very much among themselves: some rank nearly as low as worms: some nearly as high as reptiles; and if fish could have risen into reptiles, and reptiles into mammalia, we would necessarily expect to find lower orders of fish passing into higher, and taking precedence of the higher in point of time. Now, it is a geological fact; that it is fish of the higher orders that appear first on the stage, and that they are found to occupy the same position, during the vast period represented by five succeeding formations. There is no progression. If fish rose into reptiles, it must have been by a sudden transformation: it must have been as if a man, who had stood still for half a life-time, should bestir himself all at once and take seven leagues at a stride."

It is rather wonderful, admitting this hypothesis, that we have not found some

evidences of this development among the living species of animals. But so far from this, in the present races, all things continue as they were from the beginning. It is wonderful, too, that the progression stops at man: why should not the conatus at perfection go farther. Perhaps, however, these theorists consider that from man to woman is a decided advance, and they would, doubtless, most cordially say of their dear goddess, Nature, what the Scotch poet, Burns, has said so aptly for them:—

“Her prentice han’ she tried on man,
And then she made lasses, O.”

But the advocates of this, and all other such hypothesis, mistake the meaning of the word law. A law is nothing but the mode, according to which an intelligent being acts, and without such intelligence and power it is nothing. And yet there is a class of scientific men who delight to refer every process of the visible world, to bare, simple law, and who apparently love nothing better than to hustle the Deity out of his own creation. They seem to think it unworthy of philosophy to bring in the Almighty to untie any hard knot, or to solve by his power any of the mysteries of created existence. Thus Laplace originated the nebular theory, which if not atheistic, is the next thing to it. If we suppose the solar system to have been once composed of a vast mass of nebulous matter, expanded by heat to vapour and gas, and then to rotate from west to east on its axis, and then to condense, and, as it condenses, to throw off a ring here, and a planet there, and a satellite elsewhere, we shall make a world most rarely. God shall be dismissed as a defunct idea. But alas for Laplace! better telescopes than were to be had in his day, have shown that the nebulae are mighty aggregation of stars, the bright walks where the Deity has shed the most massy light about his feet; and the theory has melted like the baseless fabric of a vision, and left not a trace behind. The business of science is to discover the modes of the divine procedure; it should walk the paths of the Creator devoutly, and humbly recognise him wherever he has written his name. And when we read this name all over the vast universe, the impress of the signet of the Great King, on rock, on herb, on plant, on star, can we

translate it into anything else than this: *I am; the sole self-existing One.*

But we are treated to a farther extension of the development theory. It has been found, that when galvanic currents have been passed through certain vegetable infusions, minute forms of life appear. Without stopping to ascertain whether these are not creatures, whose microscopic germs have been scattered by nature with an unsparing hand, they have been assumed to be monads, and it has been inferred that matter is essentially vital, and that these are the lowest of its vital forms. And so instead of starting man from our gaping oyster, we must get us down to the little scarcely visible monad, which is beginning to roll and toss itself in the waves of a stream of galvanism. Hence, says Professor Oken, “No organism has ever been created of a larger size than an infusorial point. No organism is, nor ever has one been created, which is not microscopic. Whatever is larger, has not been created but developed. Man has not been created, but developed.” This is natural history with a vengeance. Think of a mammoth’s being developed from a microscopic monad; he must have outgrown his clothes very often! You will not be surprised to hear, that the author of the above statement confesses that he wrote his system in a kind of inspiration. It must have been an inspiration like that of Swedenborg, who tells us that he would lie in bed two days or so, without eating, and then get up, and after drinking strong coffee, would write off, as fast as possible, his visions of the spiritual world. “The more modern and accurate researches of Ehrenberg have shown, beyond all doubt, that these monads are true animals, the minutest of all living beings hitherto discovered. Not less than twenty-six species of them have been described and figured by microscopists, the smallest of which never have exceeded the twelve thousandth of an inch in diameter.”

Galvanic currents have been passed also through solutions of silicate of potash, nitrate of copper, and ferrocyanate of potash, and living animalcules of the mite family have appeared. From this and the preceding experiments, galvanism has been inferred to be the vitalizing principle of the earth, and Mr. Miller tells us, he has heard it seriously asked, if electricity

be not God! But alas for such vaulting science! these animalcules are found not to be "a new species, but the repetition of an old one, a little bristle-covered creature, of the mite species, that harbours in damp corners, among the debris of hothouses, and the dust and dirt of neglected workshops." Their germs are remarkably tenacious of life, can resist for a time the application of boiling water, and can even live long in alcohol. All these little creatures have an immense power of reproduction, so that their presence in any earthy matter whatever, is by no means surprising.

How would the philosophers of this school explain the well-known fact, that when the oak of a woodland is cut off, it is frequently followed by a growth of some other kind? The surface soil of the earth is doubtless full of germs, the product of growth long since past, and of which all traces have disappeared. Unless we suppose that these germs are capable of lying in the earth, for centuries, in a quiescent state, we must have for them too, a development theory, and one which can do its work quickest.

What is the moral bearing of this scheme of development? It is not necessarily atheistic, for it may assume a God, who has made life dependent on chemical laws. It asks for a Deity at creation's starting point, but after that, it claims to be able to get on without him. It has a bearing, however, on the question of man's immortality. According to it, all the forms of organic life are immortal, or man is not. The wildest imagination has never pretended that there was an immortality not only for every species, but for every individual of animated nature. "What mind," it has been asked, "regulated by the ordinary principles of human belief, can possibly hold, that every one of the thousand vital points that swim in a drop of stagnant water, is inherently fitted to maintain its individuality throughout eternity." But in this theory man and the animalcule occupy the same category. The only life for us after death, is the resolution of our bodies into monads and maggots. "Job solaced himself with the assurance, that even after worms had destroyed his body, he would in flesh see God. Had Professor Oken been one of his comforters, he would have sought to restrict his hopes to the prospect of living in the worms."

Must there ever be this antagonism between reason and faith? Must young born science again and again pluck the beard of ancient and venerable truth? Must the reproof be repeated to men who ought to blush to need it? "Have ye not known? Have ye not heard? Hath it not been told you from the beginning? Have ye not understood from the foundations of the earth? It is He that sitteth upon the circle of the earth, that stretcheth out the heavens as a curtain, and spreadeth them out as a tent to dwell in. Lift up your eyes on high, and behold who has created these things, that bringeth out their hosts by number: he calleth them all by names, by the greatness of his might, for that he is strong in power: not one faileth."—It is gratifying to know, that not only the refutations, but the sternest rebukes of these wild theories have come from men of science.

Let us now turn away from these antagonisms, and look, for a moment, at the results of science on their positive side. We have seen the races of organic life progressing; we have seen the earth undergoing changes—which we may without temerity call advances—to its present state. Shall all progression end here? Cuvier is said to have felt sad at the thought of "a coming period, in which man would have to resign his post of honour to some nobler and wiser creature—the Monarch of a better and happier world." But we have been better instructed. We know that in the next step forward, we shall participate: it will be an advance for ourselves. The analogies of science suggest the expectation of a progress. Revelation gives assurance of what kind that progress shall be. The curtain will not fall here. God is not yet done. The day will come when it shall no longer be said, "Man being in honour abideth not;" for we, according to His promise, look for a new heaven and a new earth, wherein dwelleth righteousness and immortality.

A FRENCH statistical writer once took his station near the staircase, at a London ball, for the purpose of ascertaining the proportion of gentlemen who arranged their hair with their fingers before entering the room, and found them to average about twenty-nine out of thirty.

127—Leap-Year. J. D.—To ascertain at any time what year is leap-year, divide the date of the year by four; if there is no remainder it is leap-year.

128—Derivations of the term Algebra. G. S.—Algebra is derived immediately from the Arabic; the particle *Al* implying *excellent*, and *Giabr* being, as is generally supposed, the name of its inventor.

129—Definition of the term "Mummy." J. B.—"Why is an embalmed body called a Mummy?" Because of the Egyptian word called *mum*, wax, which is used in embalming. The custom of embalming originated in a vanity amongst the Egyptians of being considered immortal.

130—Origin of Coaches. S. H.—The word coach is originally derived from the Italian *carroccio*. The inventor of this species of conveyance, is said to have been a ruler of Greece, who being afflicted with lameness, devised a carriage, not only for his convenience, but to conceal his personal deformity.

131—Position of Pulpits. J. D. S.—Originally all pulpits faced to the west, that the eyes of the congregation might see all acts of devotion and look towards the East, whence the Sun of Righteousness arose. The first deviations from this rule were introduced by the Puritans, and the first chapel erected south and north was the chapel of Emanuel College, Cambridge, founded by Sir Walter Mildmay, a distinguished leader of that sect.

132—The First Ship in the Royal Navy. G.—"When, and by whom, was the first vessel of war built in England?" The first ship which can properly be said to have been built for the Royal Navy of England was the *Great Harry*, built by Henry VII., from whom it took its name, and at an expense of £14,000. It was afterwards accidentally consumed by fire at Woolwich, in 1553. This vessel, of which a representation may be seen carved on a monument in Canterbury Cathedral, had four masts; she was of immense burthen, and her complement was 700 men, of whom one-half were soldiers.

133—Flying of Birds. J. C. R.—From the action and reaction of bodies upon each other being always equal and contrary, we learn in what manner a bird, by the stroke of its wings, is able to support the weight of its body. If the force with which it strikes the air below, is *equal* to the weight of its body, then the bird will, as it were, *rest* between the two forces. If the force of the stroke be *greater* than its weight, the bird will *rise* with the difference of these two forces; and if the stroke be *less* than its weight, then it will *sink* in proportion to the difference between them.

134—Vegetable Poisons. G. L.—It happens that all the most virulent poisons are of vegetable origin. There is the burning nicotine, and the deadly aconite, which destroys in small fractions of a grain; and strychnia, a fourth part of a grain of which has killed a wild boar in a few seconds; and prussic acid, so prevalent in many botanical tribes. Then there are the deadly alkalies of hemlock and tobacco, and oxalic acid of treacherous fame, all derived from the vegetable kingdom. Before the rapidly mortal action of some of the vegetable products we have mentioned, arsenic, that terror of the mineral kingdom, is innocence itself, and sublimate is impotent.

135—Mechanical Helps to Arithmetic. S. M.—There have been various mechanical helps to the attainment of the early rules in arithmetic. Sir Samuel Morland, in the reign of Charles the Second, invented two arithmetic machines, of which he published an account under the title of *The Description and Use of two Arithmetic Instruments*, &c. This work is illustrated with twelve plates, in which the different parts of the machine are exhibited; and from these we learn that the four first rules can be very readily worked, without (according to the author) charging the memory, disturbing the mind, or exposing the operation to any uncertainty.

136—Glass. M.—The art of making glass was introduced into England from France, in the year 674, for the use of churches and monasteries. Benedict Biscop, who in that year founded a monastery, and attached to it an elegant church of stone, after the Roman manner, prevailed on some glassmakers in France to come over and glaze the windows. These artificers not only performed the work assigned to them, but also taught the English how to make windows, lamps, and drinking-vessels. Before that period, the windows of houses and churches were filled either with linen, cloth, or lattices of wood; and even in the twelfth century, glass windows in private houses were very rare.

137—Volcanos. H. M.—It is supposed that the number of active volcanos in the world is one thousand—if we include all those still retaining some degree of heat, although at present dormant. The number, however, of known burning volcanos is estimated at two hundred, which are distributed as follows:—One on the continent of Europe and twelve on its islands; sixty-six in Asia; one hundred and seventeen in America, and several in Africa. The number now is not so great as in ancient times. The whole face of the earth exhibits appearances to lead the geologist to believe, that they were once not only more frequent than at present, but that their eruptions were on an incomparably larger scale.

138—Floating Ice Mountains. F.—The origin of the immense ice mountains which northern navigators so frequently meet, is difficult to be ascertained. The ice which obstructs the navigation of the Arctic seas, is of two different kinds. One kind is formed by the congelation of salt water. It is fibrous, very porous, and not at all transparent. Sometimes, as far as the eye can reach, a compact unbroken field extends; again, the whole ocean seems filled with floating fragments, closely jammed together; again, those fragments are so separated that a ship may work its way along between them; and, still again, these fragments, dashed together by the winds, are ground up to minuter fragments, called *masé ice*.

139—Formation of Dew. E. W.—The formation of dew is explained by Dr. Wells, in the following way:—On a fine night when there are no clouds, the heat absorbed by the earth from the sun during the day has a tendency to disperse itself through free space, and of course leaves the surface of the earth cold; by this coldness the watery vapour in the air is condensed, and falls down in the shape of dew. In countries near the equator, the deposition of dew is much more abundant than in England, because there is more

heat absorbed from the sun during the day. In cloudy nights there is no dew deposited, because the heat of the earth is met in its passage upwards by the heat possessed by the clouds, and by that means an equilibrium is established, as the earth then receives from the clouds as much heat as it gives out. Frost is frozen dew.

140—Mode of computing Time. W. G.—The mode of computing time as established by Pope Gregory XIII., in 1582, is called New Style, and that by Julius Cæsar, Old Style. The New Style was adopted by Spain, Portugal, and part of Italy on the same day as at Rome, and in France on the tenth of December following, which was reckoned the *twentieth* day. But in Great Britain this change was not adopted until September, 1752, when 170 years had elapsed since the Gregorian alteration, consequently a little more than another day had been gained. It was therefore enacted by parliament that *eleven* days, instead of *ten*, should be struck out of the month of September, 1752. On the second day of that month the Old Style ceased, and the *third* day was reckoned the *fourteenth*. By the same act Great Britain changed the beginning of the year from the 25th of March to the 1st of January.

141—Discovery of Plate Glass. C. M. R.—Blancourt relates, as the mode in which the casting of plate-glass was discovered, that a person who was melting some of this material in a crucible, accidentally spilt it, while fluid, upon the ground. The metal ran under one of the large flag-stones wherewith the place was paved, which obliged the workman to take up the stone in order to recover the glass. He then found it in the form of a plate, such as could not be produced by the ordinary process of blowing. The man's attention being roused by this fact, he was unable to sleep, and conceiving at once the superiority of this method for forming mirrors, he immediately commenced experimenting, and before the day appeared, had proved the practicability of the improvement which the purest chance had thus placed within the sphere of his observation.

142—Importance of Correct Emphasis in Speaking. G. M.—A due attention to the rules of grammar and a careful and deliberate manner of speaking will prevent the occurrence of improper emphasis on words. Many amusing anecdotes are told of blunders arising from a want of knowledge in this respect. One will serve as an illustration:—"A schoolboy reading to his master, and pronouncing every word with a more than proper emphasis, had received repeated reproofs, but particularly concerning the word "honour," which the master told him should be pronounced "onor," and desired him in future to drop the H. The lesson had taken up a longer time than usual, so that the master (whose breakfast had been detained till it was quite cold) was not a little vexed, and taking up the muffin, gave it the boy, saying, "Here, you little stupid! my muffin is quite cold; take it into the kitchen, and *heat* it." The boy was gone so long that the master's patience being exhausted, he sent for him, and he returned with the last piece in his mouth. "What!" exclaimed the master, "you have not devoured my muffin, I hope! I told you to take it to the kitchen and *heat* it."—"Yes, sir," replied the boy, who had just swallowed his mouthful, "but you told me always to drop the H."

143—Immersion of the hands in melted Metal. J. J. L.—"We read in history of persons who have undertaken to prove their innocence of imputed crimes by walking barefoot on hot iron, and thrusting the hands into melted metals. How was this accomplished?"—The experiments of jugglers have proved to all, that, under certain conditions, the hand can be immersed with impunity in melted metal. Little more is required than to rub the hands with soap, so as to give them a polished surface, then to plunge them into a cold solution of water and sal-ammoniac, afterward to put them into the liquid iron, lead, bronze, or other metal, moving them rapidly through it, but not too rapidly. The explanation of this curious fact is this. When the hand is plunged into melted metal, the skin is not in contact with the metal, and, therefore, the heat incident upon the skin can arise only from that which is radiated from the metal. The moisture of the skin passes into the spheroidal state, and reflects the radiating caloric, so that the heat is never at the boiling point. Heat and light exhibit, through transparent bodies, a very remarkable difference. Transparent alum, which is as clear as the clearest water, transmits only twelve per cent. of heat, while rock-crystal, which is not more lucid, transmits ninety-seven per cent. of heat. Black glass allows ninety per cent. of heat to pass through it, while green glass, coloured by oxide of copper, and covered with a layer of water, will, though perfectly transparent, almost entirely deprive the solar ray of heat.

144—Chemical Laboratories. F.—"I have a great desire to form a small laboratory, for the purpose of making a few chemical experiments. Can you furnish me with any instructions on the subject?" Without going into details, we may observe that the construction of a proper laboratory entails some care and expense. It should be furnished with suitable benches, mortars, a sand-heat, a variety of glass vessels, consisting of retorts, matrasses, funnels, &c. &c.; and a copper alembic or still, for procuring a variety of distilled waters, oils, &c., besides a furnace for the purpose of boiling, melting, and other processes, requiring the immediate contact of fire. A blow-pipe and charcoal are essential. We would recommend extreme caution in the use of any combustible ingredients. Many *experienced* chemists, for want of due vigilance, have been seriously injured from accidents of this nature. As an example we will relate the following:—By the addition of nitric acid to the solution of potash and phosphorus in alcohol, a nitrate of potash is formed, crystallizes rapidly, and is deposited at the bottom of the liquid. When completely separated from the latter, and strongly heated, it produces the same effects as common nitre; but if the mixture of liquid and salt be heated to desiccation, a violent explosion is the result. "Not being aware of this effect," says L. Lementini, a foreign chemist, "I evaporated to dryness about 36 grains of the salt mixed with this liquid. The detonation was so violent as to beat me to the ground, completely stunned, and I remained deaf a whole day. Everything brittle on the table of the laboratory was broken to shivers. Considering the small quantity of matter capable of producing such an effect, I conceive that next to detonating silver, this substance is the most violent with which we are acquainted."

POPULAR GEOLOGY.

CHAPTER XI.—SUPERFICIAL STRATA, &c.

Probably an era betwixt the Tertiary Formations and those of our period.—FROM the depths of the earth's crust we have now re-ascended to the surface, and seem, for the moment, as we look around, to have nothing left to occupy our attention but those superficial accumulations with which our eyes and our feet have been familiar from childhood—the gravels, sands, clays, and peats, &c., of our own country, and which in other countries are varied by the existence of shell-beds, coral-reefs, &c. But on a more careful review we find many things of interest lying about, and the origin of which suggests interesting questions. As we examine these we are led to believe that between the era of the Tertiary strata and that to which we ourselves belong, there has existed another—perhaps more than one—period, of a transitional character, to which no name has been attached; but to which belong certain clearly distinguishable phenomena.

Denudation.—We have already described the geological meaning of the word “fault.” Let us now add that there are often found great faults, or hitches, in the superficial strata, which, if left as they were originally formed, must have caused striking irregularities in the face of the country, through the one side, that was uplifted, remaining standing up much higher than the other: but there is no such inequality left. The Coal-field of Ashby de la Zouch may be instanced. Here there is a fault. We see in them that the beds, or strata, have been forcibly ruptured, and certain strata on one side raised five hundred feet higher than the corresponding and formerly united strata on the other. But if any one walks over the top of both sides he will find them level. What, then, has become of the five hundred feet of rock that must have originally projected above the surface on the raised side? It has been all washed away by the action of water. This is what is meant by *Denudation*; and we may see how potent an agent it has been in bringing the world to its present state. Professor Ramsay has shown that certain portions of rock removed from the top of the Mendip hills, must have been nearly a mile in thickness, and they were also washed away by water.

There is another class of cases only to be explained by the power of denudation. We find extensive valleys hollowed out in the sedimentary strata, leaving the sides facing each other at considerable distances, and having sometimes a mass standing up between them to the same height and, evidently forming a part of the original uninterrupted range of rock before the valleys were formed by the removal of their contents. This phenomenon is explained by the action of water in washing away—and making a channel for itself through—the softer portions of the rock.

Diluvium.—This term has been applied to the next class of phenomena of which we shall speak. Below the superficial covering of mere vegetable soil, mixed as it generally is with the minute fragments of disintegrated rock, and above the stratified rocks of all eras, we find in all parts of the world, and generally in somewhat low situations, a layer of stiff clay commonly of a blue colour, but sometimes reddish, varying in thickness from only a few feet to above a hundred feet, and mixed with fragments of rock that bear the marks of having been much rubbed and worn by travel, and which vary in size from that of an egg to the dimension of large isolated rocks, or Boulders, weighing many tons. This is sometimes called the Boulder formation, and is supposed to have been the product of some vast deluge—hence the name, *Diluvium*—or of the sea in a state of unwonted agitation even for those agitated periods.

Boulders, &c.—The fragments in question can generally be traced to their source in certain parent masses, lying often at great distances. This is as true of the largest

boulders as of the smallest stones. Thus, pieces of the granite of Shap Fell are found fifty miles away from the latter; and one Boulder rock, in particular, lies high up the Criffel mountain, on the opposite side of the Solway estuary. Parts of the primitive rocks of the Lammermuir and Cheviot ranges are also scattered through the vale of the Tweed, and in Northumberland. Blocks from the Welsh mountains lie about in the midland counties; and others, on the east coast, are presumed to have travelled thither from Norway. It is not likely that the exact same agency was concerned in the transport of these large masses as sufficed for the smaller ones. The latter might have been driven to and fro by the mere chaotic force of the water; the other could only have been transported to great distances by some additional power. This we find in icebergs; which, as we have already had occasion to state, are now continually transporting masses of rock. These, while imbedded in ice, are broken off from the parent mass, fall into the sea, and are then tossed about till they reach a region of a milder temperature, under which they melt and drop their enclosed burdens. In one of the recent voyages of discovery to the Arctic regions, this process of transportation was seen going on. There was a dark-coloured, angular shaped piece of rock, five or six feet wide and twelve feet high in its visible proportions, to say nothing of what might be concealed in the iceberg that enclosed it, which was between two hundred and three hundred feet high, and at least 1400 miles from any known land. As a whole this Boulder formation seems to tell us of a period when much of what is now dry land must have been under water: a fact that appears at once curious and interesting if we think of it as the *latest* of an almost infinite number of extensive risings and fallings of the earth's crust. And how this alternate action and reaction, advance and retreat, seems to foreshadow man's own mental phenomena! May we not hope that it is with him as with his material home—that on the whole he progresses grandly and beautifully, however full of reverses and disappointments his course may seem to those who look but for a time on his movements.

Marks on Rock Surfaces, &c.—In immediate connexion with the phenomena we have described, are certain marks or grooves often found on the surfaces of rocks in a peculiar position, and which appear to have been made by heavy and hard bodies, as they were rapidly hurried along by some irresistible force, as by that of a flood, for instance, bearing upon its bosom great masses of ice.

Crag and Tail.—The rocky elevations, abrupt on one side and gently sloping away on the other, to which geologists have applied the quaint appellation of "Crag and Tail," belong also to the peculiar class of geological effects now under review.

Clay and Gravel Ridges.—The same may be said of the long ridges of clay and gravel which are found in various parts—in Finland, Sweden, and the United States, for instance. We can readily understand how these were formed after perusing Mr. Simpson's work on the *Polar Seas*, where he describes the breaking up, during summer, of the ice formed in the previous winter over gravelly districts, of the driving in upon the shore of the ice-fragments by the wind or the tidal waves; of their accumulation on the beach in long ridges, which melting, leave the embedded gravel behind.

The foregoing Phenomena appear to have had One Common Origin.—It is a very remarkable circumstance that all these phenomena seem to have had not only one common *general*, but also a *special* origin;—that is to say, they all seem to have resulted from the action of a grand watery current, sweeping from the north and north-west towards the south-east; for the direction of the diluvial blocks, of the grooved lines, of the crag and tail, and of the clay and gravel ridges, is all of that character. What sort of a current, or flood, this must have been, our readers may judge for themselves, when they know that it included within its range not only Europe but America.

Glaciers.—The origin of Glaciers is so intimately connected with that of Icebergs, and also with that of the Boulder formation, that we need not apologise for the introduction of the subject in this place. By Glaciers we understand those enormous masses of ice which are formed on the slopes of lofty mountains, and in the intervening

valleys, and which remain apparently eternally unchangeable. Let us, with the help of an eminent foreign geologist, Saussure, picture to ourselves the aspect of the most famous of the glacial regions—that of the Alps. Let us imagine ourselves at a sufficient height above these stupendous mountains to overlook the whole, and thus be able to embrace at one view the Alps of Switzerland, Savoy, and Dauphiné. What do we then see? A mass of mountains, intersected by numerous valleys, composed of several parallel ranges, the highest in the middle and the others gradually receding on each side. This central chain appears bristling with craggy rocks which are covered, even in summer, with snow and ice, except where their sides are directly perpendicular; while, in strange contrast, the deep valleys are green and beautiful, well watered, and covered with villages. Looking still more closely into the details of the wonderful scene—the sublimest perhaps, that earth can afford—we perceive that the central range consists of lofty peaks and smaller chains, snow-topped, with all the slopes that are not directly vertical covered with ice, while the intervals between form elevated valleys, containing enormous masses of ice, extending downward into the deeper and inhabited valleys of the lesser bordering chains. The chain nearest to the centre presents the same aspect on a smaller scale, but beyond that one we see no more ice or snow, except upon the peaks of some unusually high summits. Such is the home of the glacier. Between Mont Blanc and the borders of the Tyrol there are about four hundred glaciers, of which the smallest are generally two or three miles long, while most of them range from ten to fifteen miles long and from one to two miles and a quarter broad. Altogether it has been calculated that the glaciers of the Tyrol, Switzerland, Piedmont, and Savoy cover an area of nearly fifteen hundred square miles. The constant increase of ice at the summits of the Alps, where of course the cold is greatest, would add as constantly to their height were it not for its descent in the form of glaciers into and through the valleys. Sublimity is not the only element of the scene; its beauty is scarcely less attractive when we pass from the whole to study the component parts. Thus, for instance, (as Sir C. Lyell notices), the ice in descending the steep slopes falling from the abrupt precipices, or in being forced through narrow gorges, is broken into a thousand fantastic or picturesque forms, with lofty peaks and pinnacles projecting upwards. “These snow-white masses are often relieved by a dark background of pines, as in the valley of Chamouni, and are not only surrounded with abundance of the wild rhododendron in full flower, but encroach still lower into the region of cultivation, and trespass on fields where the tobacco-plant is flourishing by the side of the peasant’s hut.”

Glacier-motion.—The cause of the motion of the glaciers has been much discussed among scientific men. The result seems to be a tolerably general agreement that the chief agent of motion is gravity, acting upon a plane more or less inclined and upon a body capable of a certain amount of self-adaptation to the surrounding circumstances, and aided by the melting of the bottom of the glaciers, where they rest upon the earth, through the higher temperature of the latter. This self-moulding power of ice is much more considerable than one would at first suppose. The following interesting experiment was made by the secretary of the Royal Society. He filled with water a hollow shell of iron an inch and a half thick, and having an internal cavity of ten inches diameter. This was exposed to severe frost, the fuse-hole of the shell being placed uppermost. As the water froze would it burst the cell or force the ice out at the hole? The answer was the protrusion of the ice in the form of a cylinder, which grew on, inch by inch, as a larger quantity of the water became frozen. Sir C. Lyell states:—“A series of beautiful experiments enabled Professor Forbes to determine, for the first time, the true laws of Glacier-motion, which were found to agree very closely with those governing the course of rivers, their progress being faster in the centre than at the sides, and more rapid at the surface than at the bottom. This law was verified by carefully fixing a great number of marks in the ice, arranged in a straight line, which gradually assumed a beautiful curve, the middle part pointing down the glacier and showing a velocity there double and treble that of the lateral parts. He ascertained that the state of advance by night was nearly the same as by day, and that even the

hourly march of the icy stream could be detected, although the progress might not amount to more than six or seven inches in twelve hours." By the incessant though invariable advance of the marks placed upon the ice, "time," says Mr. Forbes, "was marked out as by a shadow on a dial, and the unequivocal evidence which I obtained that even whilst on a glacier we are, day by day and hour by hour, imperceptibly carried on by the resistless flood of the icy stream, filled me with admiration." In order to show or explain this remarkable regularity of motion, and its obedience to laws so strictly analogous to those of fluids, the same writer proposed the theory that the ice, instead of being solid and compact, is a viscous or plastic body, capable of yielding to great pressure, and the more so in proportion as its temperature is higher, or as it approaches more nearly to the melting point.

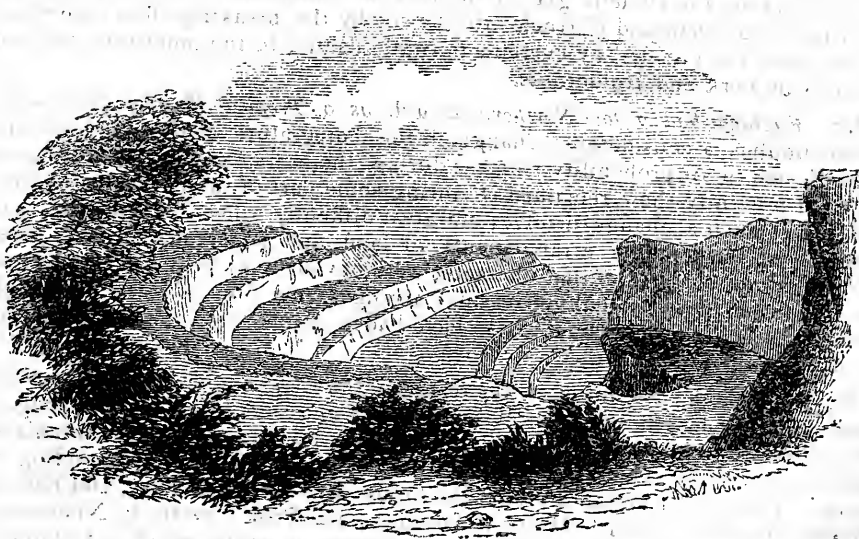
English Glaciers.—Now what is true of the existing glaciers of the continental Alps, was doubtless also true of the glaciers of our own mountainous regions when they existed; for we have no doubt that they did exist in such districts as the Welsh mountains. The investigations of Agassiz and others, and the known greater extension of the glaciers of the Alps in past times, renders it highly probable that this "ice-power," as it has been called, has been actively at work (during former eras) in parts where now no fields of ice are ever found. Applying this fact to our mountainous regions, we see at once the explanation of the smoothed and rounded rocks, the grooved surfaces, the channels parallel to the grooves, and other phenomena, for all these are known to be produced by glaciers on the surfaces they pass by or over. Of course, an iceberg is but a floating glacier, and therefore there is no difficulty in understanding how the boulders we have spoken of were originally imbedded in a glacier, which was either carried by its own motion to the water, or to which the waters came in the course of the differing geological phenomena we have described. Thus, to borrow an illustration from the *Penny Cyclopædia*, the ancient glacier streams of Cumberland may have delivered the detrital blocks of Shap and Carrock into the sea by the breaking off of icebergs, which may then have been drifted by currents to Staffordshire, to the mouth of the Tyne, and the valleys of York and Holderness.

Has England had a low Northern as well as a Tropical Temperature?—All this, however, implies a considerable change in the temperature of England, which, as we have seen, was in all probability tropical during the earlier geological eras, and which, as we shall presently show, remained so during some part of the period at present under review. But such a change involves no great difficulty when we consider that mere alterations of the relative arrangements of land and water immediately affect the temperature, and changes of that character were obviously of frequent occurrence while the earth was, as it were, making its final arrangements for the state of things which includes man. We seem, therefore, to have had a glacial period, among the numerous other periods already spoken of.

Ossiferous Caverns.—But of all the results of the Diluvium phenomena, the ossiferous caverns are, perhaps, at once the most popularly and scientifically interesting. These are so called from *os*, bone, and *fero*, I bear—words referring to the remarkable contents of the said caverns. They are found in various parts of the world, including our own country. The chief English ones are the following:—Banwell Cave, and Hutton Hole, in the Mendip hills; Kent's Hole, at Torquay; the Peak Cavern, in Niddesdale; and Kirkdale, in Yorkshire. They occur in the limestone strata, which is peculiarly liable to be hollowed out by the action of springs and subterranean waters. We shall briefly describe Kirkdale Cave. This is situated about twenty-five miles north-east of York, and occupies an elevated position overlooking the valley of Pickering. It has been explored to the depth of about 250 feet. The breadth of the cavern varies from that of a very narrow passage to about five feet. The height generally does not exceed three or four feet, but in parts a man can stand upright. At the mouth there is an expansion, forming a kind of ante-chamber to this primeval wild-beast mansion; and there it was that the bones of the more important animals were found, sticking up through the floor of the stalactite caused by the droppings of the roof, like the legs of pigeons through a

pie-crust, to use Dr. Buckland's savoury image. It is to this stalactite we are indebted for the preservation of the bones. Liebig's explanation of the origin of the stalactite is as follows:—He found on the surface of Franconia, where limestone caverns abound, a fertile soil, containing a considerable quantity of decaying vegetable matter, which when acted upon by air and moisture gives forth carbonic acid which dissolves in rain. Rain-water thus impregnated, passes through the porous limestone, dissolving some of the latter on its way, until it reaches the interior of the cavern, where it loses some of its carbonic acid by evaporation, and where it also parts with its calcareous matter, and that which remains is stalactite. Beneath the stalactite was found the true floor, of clay. The bones included the remains of twenty-three species; and a most extraordinary assemblage they represented, namely—hyenas, tigers, and bears, side by side with larks, pigeons, ravens, ducks, and partridges; the hippopotamus, rhinoceros, and elephant, accompanied the deer, (three species), the ox, and the horse; the remains of the wolf, the weasel, the fox, and the water-rat, were mingled with those of the rabbit, the hare, and the mouse. The bones of the gentler animals were much broken, and presented altogether the appearance of their owners having formed the food of the fiercer ones. The remains of nearly three hundred hyenas have been traced among these bones, including individuals of every age. The species is now extinct. It was larger than the terrible hyena of South Africa, the *Hyena crocuta*. There is no doubt these animals lived here, as a large quantity of their dung was found, which, as in the case of the existing hyena, is nearly of the same composition as bone, and scarcely less durable. No doubt exists, therefore, but that these were the true tenants of the cave, and that the bones of the larger animals were brought in by them from the neighbourhood: and so we get another glimpse of England in its tropical, or semi-tropical days.

Ancient raised Beaches.—In the foregoing paragraphs we have had chiefly to deal with incidents arising out of the great event or events that caused so large a portion of what had been dry land again to be buried beneath the waters. We



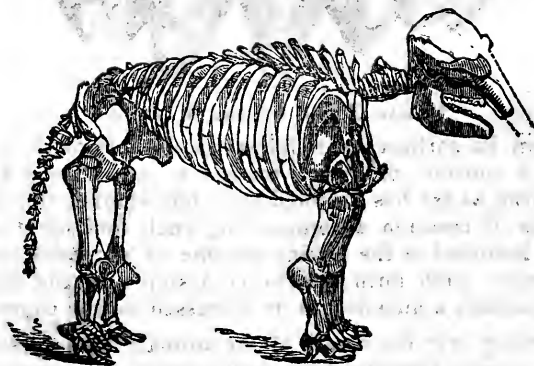
THE VALLEY GOZZO DEGLI MARTIRI, SICILY.

have yet to speak of those which reveal to us the re-emerging of the land, preparatory to its becoming our home. Near, and often at some distance inland from it, are found terraces of the kind shown in the accompanying engraving, and which might almost be mistaken for the remains of some ancient amphitheatre which man had created. Such terraces are found in Britain, Scandinavia, America, &c. There can be no doubt what they are—the beaches on which the sea once rested; and their

successive elevation one above another shows how the sea-bed has been itself elevated from time to time. The highest was the earliest coast line; then there was an elevation of the district, and what is now the second terrace became the coast line, and so on. Such risings of the sea-coast have been going on in our own historical era. Sweden, indeed, is said to be still rising at the rate of about forty-five inches in a century.

Organic Life.—The extensive submersion of which we have spoken must have had a serious effect on the animal life of the time; but it is not true, as some have supposed, that this injury extended to absolute destruction and new creation. We find some species of the Tertiary era identical with some that now exist. A badger of the Miocene period, for instance, is considered to be indistinguishable from the badger of the present time. So, again, there exist in India many reptiles known to be coeval with the extinct Anoplotheri, Mastodon, &c., of the Himalayas.

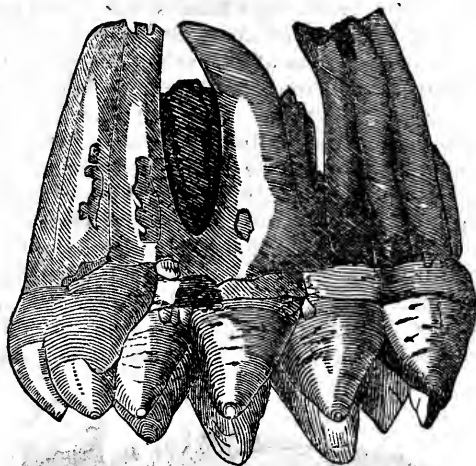
The animal remains of the other superficial strata, (the latter including filled up lakes, the deposits of rivers beside their margins, and of the greater rivers at their mouths, as in the deltas already spoken of in earlier chapters, peat-mosses, vegetable soils, &c.,) all betoken that they belong to a zoology which was passing gradually from the tertiary to the present period. Thus we find in superficial deposits in North America, the remains of the extinct Mammoth and Mastodon by the side of the remains of the same buffalo as that which still roams in countless herds over the prairies of the same country. Again, to borrow an illustration from our own country, at Market Weighton, in Yorkshire, there have been found in the earth of a like deposit, the bones of the bison, elephant, rhinoceros, wolf, some feline animal, horse, deer, and birds, all differing in some respects from their congeners of to-day, but associated with some thirteen species of shells, terrestrial and marine, which are identical with shell-fish now living in the neighbourhood. To our engraving of the Mastodon we must append a few words. It has been called the animal of the Ohio,



from the number of its bones that have been found in the north part of Kentucky, near the Ohio river, at a place called (obviously in consequence) the Big-bone Lick. The following engraving, in our next page, of the molar tooth of the Mastodon, which is very much reduced below the natural size, suggests even more than the complete skeleton of the animal, its terrible size and character. It was probably about the height of the elephant, but longer and stouter. M. Fabri, a French officer, told Buffon, the eminent naturalist, that the red-men of America considered these bones to belong to an animal which they named the *Père aux Bœufs*, or, Father of the Oxen, and to which they attach a noticeable tradition. They say that with these animals there existed men on the same gigantic scale, and that the Great Being destroyed both with thunderbolts. The Virginian Indians give the story to the effect that as a troop of these tremendous creatures were destroying the deer, bison, and other animals created for their—the Indians—use, the "Great Man" slew them all with his thunder except the Big Bull,

who, nothing daunted, presented his enormous forehead to the bolts and shook them off as they fell, till at last, being wounded in the side, he fled toward the great lakes, where he is to this day.

The great distinction between the zoology of the present as compared with all earlier geological eras, seems to be this:—Formerly there was an immense number of individuals in each of the species that did exist, but the number of species, and still more those of genera and orders, were limited; now, on the contrary, while there is a wonderfully rich development of various kinds of life—as shown in the great number of orders, genera, and species—the mass of individual life in each special division is proportionately limited. Development of life from a low to a higher state has been the law, not mere increase. The mode of this development is a perplexing subject. All that we can at present safely say upon it seems to be this: Looking over the whole



MOLAR TOOTH OF THE MASTODON.

field of creation, from its earliest to its latest manifestations, it is impossible to doubt that there has been a constant progress; we see as an obvious fact that higher and higher forms have risen as era has followed era; but whether this is to be attributed to so many special acts of creation accompanying each individual advance, or whether there was originally included in the Divine scheme of vegetable and animal life some power that should cause each form to advance a step upwards, under certain stimuli, is too large and too serious a question to be discussed in our pages.

Finally, in glancing over the names of the animals whose presence in the world at this early period have been discovered by their remains, we miss certain of the most familiar forms, such as the sheep and the goat, and, above all, Man himself, whom we thus perceive to be the very latest born of all the existing inhabitants of the world. In none of the older formations do we find any relics of him; nowhere, indeed, but in places and among accumulations that are evidently of the most recent character—such as in peat bogs, river sand, and the ashes and cinders of volcanic eruptions.

THE affection with which the mere fact of helplessness and dependence fills the heart of a woman is the divinest attribute of her nature. Is there a more lovely sight on earth than the devotion of a daughter to an aged, perhaps peevish, parent, sinking into a second childhood; or of a mother, to a sickly, deformed, and perhaps imbecile child, who is an offence and a burden to every one besides.

HISTORY OF ARITHMETIC.

THE importance of this noble science, from its immediate connexion with commerce, and its being the basis of almost every part of the mathematics, is a maxim so universally acknowledged, that any observations in support of it, must be entirely superfluous. In comparing magnitudes together, we are frequently compelled to call in the aid of *numbers*; and many parts of the fifth book of *Euclid's Elements*, without very often referring to numbers, would almost be unintelligible.

It is uncertain at what period Arithmetic first assumed any regular form as an art, or from whom it originally had a systematic arrangement; it must unquestionably have been coeval with commerce, which must have soon taught mankind the necessity of an inquiry into the nature of numbers, without which, nothing could have been transacted, even by barter. It is generally admitted that the Phœnicians, the descendants of Noah, were the first people who rendered navigation subservient to commerce; therefore it is by no means improbable that Arithmetic had its origin with them, and that they introduced it to Europe; indeed, in forming this conclusion, we have the support of Proclus, in his commentary of the first book of Euclid, who is decidedly of this opinion.*

Josephus, the Jewish historian, on the contrary, informs us, that Arithmetic and Astronomy were introduced into Egypt by Abraham, (when he retired there in consequence of a famine in Canaan,) which sciences he had learnt in Chaldea.

Whatever controversy has arisen upon the point of who brought Arithmetical knowledge into Egypt, certain it is, that we are indebted to that nation for it, by its transmission from them to the Greeks (by Pythagoras), from whom it descended to the Romans.

A regular system of notation must have been the first step towards rendering numbers perspicuous, which was effected by the Hebrews, Greeks, and Romans, as also

some others, by using the letters of their respective alphabets for numerical signs.

The best method adopted by the Greeks was, where the *first* nine letters represented the nine digits, and the *second* nine, the tens, from one 10 up to nine tens, or 90; the hundreds were denoted by some other letters, and deficiencies supplied by arbitrary marks for thousands, tens of thousands, &c.; although no specific treatise of their computation has been transmitted to us, we may readily estimate the difficulty arising from such an imperfect scale of notation, from two small works collected by Dr. Wallis, viz., "A Commentary upon Archimedes's Treatise of Circles, by Eutocius," and some fragments of Pappus, which mostly relate to multiplication. It is likewise said, that Archimedes employed a peculiar notation of his own in "Arenarius," a computation of the number of the sands.

The Romans also adopted their scale of numerals from the following seven capitals of their alphabet—I, V, X, L, C, D, and M. The several combinations, repetitions, and abbreviations they made use of, are too generally known to require explanation here.

Such were the modes in general use, till the second century after Christ, when the *sexagesimal* division was planned by Claudius Ptolemy; by which method, the unit was supposed to be divided into 60 parts; these again into 60 more, and so on.

To facilitate the plan, the integral, as well as fractional progression, was made *sexagesimal*, thus:—from one to 59 was written (in the then usual manner) by Roman capitals; then 60 was called *sexagena prima*, and thus marked (I'); two sixties, or 120 thus, (II'), and so on, to 59 times 60, or 3,540 thus, (LIX'); for 60 times 60, or 3,600, they wrote (I''), and called it *sexagena secunda*, &c. The practice of this, though something easier than the former, must have been extremely difficult in multiplication and division, as appears by *Logistica*, written in Greek, by Barlaamus, about 1350; translated into Latin, and published in 1600.

The difficulty and imperfection of these methods of computation, must have left Arithmetic in a very rude state, and in this it remained until the introduction of our present inestimable mode, called the

* The following passage in *Lucan's Pharsalia*, ascribes the invention of letters to the Phœnicians:—

"Phœnices primi, famæ si creditur, ausi mansuram rudibus vocem signare figuris."

Arabian, (from which nation we had it), although it is admitted that the Indians were the inventors.

Maximus Planudes was the first known author who treated of Arithmetic according to this system: his work is in Greek; he asserts, "that the ancient Greeks and Romans knew nothing of it," and acknowledges "the genius of the Easterns as the inventors, from whom the Arabians got it, and the Europeans from them." This author, according to Kircher, flourished, A.D. 1270, though Vossius fixes him as late as 1372; but Dr. Wallis contends, that the Arabic figures were known in Europe before 1000, (Guthrie's Table says 991,) and brought into England (during Stephen's reign,) towards 1150.

From this period may be dated the gradual improvements made in Arithmetic, as we find about 1200, an outline of a regular treatise, by Jordanus of Namur, which shortly after printing was invented, was published and demonstrated by Joannes Faber Stapulensis.

Jordanus also wrote a work, called *Algorismus Demonstratus*, which was never printed; though Dr. Wallis says, the manuscript is in the Savilian library at Oxford. About this time another grand improvement was made by the introduction of *decimals*; though, strange to say, the inventor is unknown—the curious on this point may consult Chambers' *Encyclopædia*, or Dr. Hutton's, and Peter Barlow's *Mathematical Dictionaries*. Regiomontanus is the first writer known to have used decimals; in his triangular tables in astronomy, published 1464, we find them instead of the old mode of *sexagesimals*; we also find them again used by Buckley and Record, two early English authors, and likewise by Ramus, a Frenchman; these all lived about 1550. But the first express treatise on decimals, is by Stevinus, (who also wrote on book-keeping,) in the year 1582.

Logarithms was the next improvement, and was, perhaps, scarcely inferior to both others, viz., the Arabic figures and decimals. Lord Napier, Baron of Merchiston, in Scotland, is the undisputed inventor; his first canon was published 1614; his lordship, however, conceived a more commodious form, which he communicated to Mr. Henry Briggs, then professor of

geometry, at Oxford; but soon after dying, the whole devolved upon Briggs, who completed and published this form, 1624.

Having thus far mentioned the several improvements made in this noble art, it may perhaps be interesting to mention a few of the early writers on Arithmetic, shortly after the introduction of the Arabic figures. The most remarkable of them, are between 1480 and 1600. In Italy, Lucas de Burgo and Nicholas Tartaglia, (the work of the former is much commended by Dr. Wallis). In France, Clavius and Ramus. In Germany, Stifelius and Henischius; and in England, Buckley, Diggs, and Record.

About the year 1629, were published, the rival treatises of Cocker and Wingate; since which time, Arithmetic has made such rapid steps to its present systematic perfection, from the scientific abilities of so many able writers, that even their names alone would almost fill a small volume.

ARITHMETICAL TERMS.

Arithmetic—From the Greek and Latin *Arithmetica*; the art of numbering.

Axiom—*Axioma*, Latin; a self-evident speculative truth.

Average—*Averagium*, Latin.

Alligation—*Alligo*, Latin; to bind, to tie, to fasten.

Aliquot—Latin; some or few.

Addition—*Add et Addo*, Latin; to add.

Corollaries—*Corollarium*, Latin, from *Corolla*; are subjoined to Theorems or Problems.

Cent—*Centum*, Latin; Cent, French; an hundred.

Claff—*Clough*, Saxon; an allowance to citizens.

Commission—*Commissio*, Latin, low; setting together.

Cube—from the Greek, a die.

Demonstration—*Demonstratio*, Latin; to prove.

Division—*Divisio*, Latin; a division severing distribution.

Divisor—Latin; a distributor.

Dividend—*Divido*, Latin; to cut off, to break, &c.

Dividual—*Dividuus*, Latin.

Denominator—Latin; he that names.

Decimals—*Decimus*, Latin; the tenth.

Definition—*Definitio*, Latin; a limiting or bounding.

Evolution—Evolutus, Latin; unfolded, turned out.

Equation—Æquatio, Latin; a laying even.

Equal—Æquis, Latin; agreeing.

Factorage—Facteur, French; factor.

Fraction—French; broken number.

Gross—French; all together.

Involution—Involutio, Latin; an unfolding.

Lemma—Latin; supposition. Also Greek; a proposition presumed.

Mathematics—From the Greek; originally signified discipline or learning.

Minorand—Minor, Latin; the number to be subtracted.

Minus—Latin; less.

Multiple—Multiplex, Latin; a number produced by multiplication.

Multiplication—Multiplicatio, Latin; a multiplication.

Multiplicand—Multiplicandus, Latin; to be multiplied.

Numerator—Latin; a numberer.

Number—Nombre, French.

Notation—Notatio, Latin; a marking.

Numeration—French.

Neat—Net, French; clear.

Practice—From the Greek.

Problem—Problema, Latin; a proposition.

Per—Latin; by.

Product—Productus, Latin; produced, set forth.

Plus—Latin; more.

Postulate—Postulatum, Latin; is a self-evident practical proposition.

Quantity—Quantitus, Latin; Quantité, French.

Quotient—Quoties, Latin; as often as, &c.

Resolvend—Resolvo, Latin; to divide, to reduce.

Reduction—Reductio, Latin; Reduction, French; bringing back.

Ratio—Latin; terms proposed.

Remainder—Remaneo, Latin; to remain, to continue.

Sub-multiple—from Sub, and multiplex, Latin, part.

Scholiums—Scholia, Latin; remarks occasionally made to explain whatever may appear intricate.

Sum—Summa, Latin; whole.

Subtraction—Subtractio, from the verb Subtraho, Latin; to take away.

Subducend—Subduco, Latin; a number from which another is taken.

Square root—from Ysgwar, Welsh; or Quadratus, Latin; and Rot, Swedish.

Theorem—Theorema, Latin; a position set down as an acknowledged truth.

Tare—Teeren, Dutch; allowance.

Tret—perhaps from Tritus, Latin; waste, &c.

Unity—Unitas, Latin; agreeing, &c.

Co-efficients—Con and Efficiens, Latin.

ADVICE TO THE YOUNG.

SELDOM have we seen any advice for the young that gave us so much satisfaction as the following. We cannot tell our young readers who wrote it, but it is so good, we hope they will read it very carefully, and try to remember all that it says to them:—

There are some things you must not do if you mean to be true scholars. You must not spend your leisure hours in idle conduct. You must not waste the long and fruitful evenings in noisy, vulgar plays in the streets, with the profane, the dissolute, the reckless, calling after strangers, and annoying peaceable citizens.

You must not be ashamed to be polite. A coarse, gross, rude address never expresses a delicate, thoughtful, well regulated mind. You must not be afraid to be right. Boys are often tempted to show their courage by ridiculing merit. They sometimes think it mean to be afraid of offending their parents, or their teacher, or God himself. Remember, that true spirit consists in following the dictates of a noble nature; and that he is the real coward who can be shamed out of his principle.

You must not find your best pleasures away from your own homes. I am always afraid of a boy who begins to be uneasy at home. When the presence of your parents and your sisters puts a restraint upon you, and you feel shy of them, be sure all is not right.

An uncorrupted and unperverted child is nowhere so happy as at home. Never suffer yourself to lose, never allow any body to taint in your bosom, the fond and kindly affections that grow up and shed their odours round the family fireside.

You must not imagine that you and your teacher have different interests. He labours

for you—he lives for you. His interest is for your welfare. His honour is in your progress—his happiness is in your highest good. If you could disturb his plans, and hinder his success, you would triumph in your own defeat.

You must not tempt others to do wrong. It is enough to lose advantages for one's self; to fail of the great ends of all education. To be the occasion of misleading and injuring another, to set about corrupting an innocent mind, to lure a guileless, confiding child from the path of purity, to estrange an affectionate nature from the love of truth and the sacred endearments of home, is a deep, deep guilt, and a malignant influence.

To all of you let me say, be punctual. If a scholar is late, the whole school is disturbed; his own progress is interrupted; the order of the day is interfered with; and what is worst of all, a habit of punctuality is not formed—a habit essential to the success and happiness of life.

"A little too late," is a fit motto to be inscribed upon the tombstones of half the unfortunates in the business of this world, and of more than half who fail of the happiness of the future.

Take pains to comply exactly with the regulations of the school. Confide in the teacher; respect the opinions he has deliberately formed; suffer him to rule within the sphere of his duty. Be not in haste to advance. Cultivate carefully the ground you go over; be sure you obtain distinct, clear ideas, and dwell upon a thing till you master it. Then, and not till then, you may safely advance.

Let others be in this class, or that; upon this or the other study, using such and such books, it matters not to you; if you are not prepared for them, they are not the class, or the study, or the books for you. To be put into them would only embarrass or confuse you, and tend to defeat the best objects of a good education.

Don't whisper; don't whisper. One thoughtless boy, one careless girl, may, by this one mischievous habit, disturb a whole school. Learn to study without buzzing; to think without moving the lips. It is easy after a little practice. Indeed, to be able to be STILL is almost a virtue, it is so necessary to order. Certainly, it is one of the graces.

A boy who can sit still and stand still, without twisting or wriggling, or fumbling in his pockets, or drumming with his feet or his fingers, has made a good acquisition. He can move with ease, and speak with composure. He can appear in a room full of company without feeling embarrassed, and rise or sit down without awkwardness.

Never make light of a serious subject, nor trifle with the misfortunes of a fellow-creature. Never take pleasure in inflicting pain.

Never sneer at a tender conscience, nor laugh at the scruples or the weaknesses of a pious heart. Contempt for principle is an affectation; nobody really feels it; and simple goodness is too rare not to be prized and cherished wherever it appears.

Do not think that I am trying to persuade you to put on the soberness and gravity of age, while you are yet children. I know all about the vivacity, the sprightliness, and the buoyancy of youth; and I love them. I would not have "a child,

"Whose blood is warm within,
Sit like his grandsire,
Cut in alabaster."

But spirit, gaiety even, is not vice; freedom is not folly; your presence may be all cheerfulness, your life all sunshine, and yet not an impure or unkind word may escape your lips; not an ungente action mar your example, not a guilty passion corrode your bosom.

THE great end of prudence is to give cheerfulness to those hours which splendour cannot gild, and exclamation cannot exhilarate. Those soft intervals of unbended amusement, in which a man shrinks to his natural dimensions, and throws aside the ornaments or disguises which he feels, in privacy, to be useless encumbrances, and to lose all effect when they become familiar. To be happy at home is the ultimate result of all ambition; the end to which every enterprise and labour tends, and of which every desire prompts the prosecution. It is indeed at home that every man must be known by those who would make a just estimate either of his virtue, or felicity; for smiles and embroidery are alike occasional, and the mind is often dressed for show in painted honour and fictitious benevolence.

FAMILIAR CONVERSATIONS ON INTERESTING SUBJECTS.

"CLARA, it is a very pleasant evening, and as we have not heard from old Peggy to-day, suppose we take a walk over that way?"

"Very well, mother, if you don't think it is too dark."

"Let us go, then: it is not moonlight I know, but the stars shine very brightly; and as we are pretty well acquainted with the road, I think we shall be able to get along. But have you nothing to take with you?"

"Yes, mother; cook made me a nice light loaf for Peggy to-day, which I was going to carry over to-morrow morning, but I might as well take it now."

"Well, make haste and get it; and here is a dish of baked apples which you may take also."

"Oh, how dark it is, mother!" exclaimed Clara, as they stepped from the light room into the yard without.

"It will appear lighter directly, Clara; I suppose you can tell why?"

"Oh, yes, mother; it is because the retina—no, not the retina, the iris of the eye, is contracted by being in a light room; and then when I step into the dark, a sufficient number of rays cannot enter at first to enable me to distinguish the different object around me; but in a few minutes the iris gets larger, and then I can see much better. Isn't that it, mother?"

"Not exactly, Clara. It is not through the iris that light is admitted, but through the pupil."

"Oh, yes! I recollect now, mother; the iris is the little circle that surrounds the pupil. But how much lighter it appears already! Why I can distinguish the different things around me quite plainly."

"And do you notice how full of stars the sky seems, Clara?"

"Yes, mother; I should suppose there were thousands of them?"

"The number of stars in our cluster has been variously estimated by astronomers. Some suppose there are not more than ten millions, while others again suppose there are at least one hundred millions; but only a small portion of this number is visible at one time to the naked eye."

"How many, mother?"

"About one thousand is the general supposition."

"You say 'our cluster,' mother; then are there other clusters besides?"

"Yes; and thousands of these are visible with the telescope, entirely distinct, and at an immense distance from each other."

"Oh, mother, what a great Being God must be!"

"Great, indeed, my child; and the more we study His works, the more we shall behold to wonder and adore."

"Has each of these clusters a sun, around which they revolve, as ours does, mother?"

"The stars, I think I have told you before, Clara, are said to be stationary; still they are believed to have a motion, but it is so slight that it is not easily detected: for this reason they are termed 'fixed stars.'"

"That motion is around the sun, is it not, mother?"

"No: each cluster is supposed to revolve around its own common centre of gravity."

"But I mean our own cluster revolves around the sun?"

"No, Clara: you must recollect that each of these stars is supposed to be a sun itself; most probably with planets, satellites, and comets accompanying it; thus forming millions of systems like our own solar system. What a sublime conception! more than our minds can well grasp; yet in nowise inconsistent with the wisdom and power of the Almighty creator of the universe."

"That is where I was wrong, mother. I thought as the sun was the centre of the solar system, it must be of the whole universe. I forgot it was only a star. But is our system far from the centre?"

"No; it is thought to be comparatively near. The Pleiades, or seven stars, are thought to be nearest the centre."

"Then are the stars named too, mother?"

"At a very early period they were divided into constellations, or collections of stars, which were generally named from the fancied resemblance they bore to some figure or animal. Thus we have the Northern Crown, which bears a strong resemblance to a wreath; and the Bull's

Head, which is so appropriately named, that different nations, who never had any intercourse with each other, have designated it in the same manner. This naming of the constellations is at least as ancient as the book of Job; for there mention is made of Arcturus, Orion, and the Pleiades."

"How many such groups of constellations are there, mother?"

"Ninety-two. Forty-eight only were known to the ancients. But here we are at our journey's end."

The nice light loaf and the baked apples were very thankfully received by poor Peggy, who alleged that "Miss Clara" would never know what it was to want, he was so kind to a poor old woman like her. After performing a few odd jobs for the old dame, which her failing health rendered her incapable of doing herself, Mrs. Wilson and Clara started for home. They had not gone far before their conversation on the stars was resumed.

"Thus you see, Clara," said Mrs. Wilson, "that it is just as easy for an astronomer, after having the heavens divided into constellations, and those constellations named—it is just as easy for him, I say, to become familiar with the heavens, as it is for a geographer with the earth."

"I suppose, mother, the constellations may be compared to countries; and the stars which compose them, to the different cities and towns found in those countries?"

"Just so."

"Some stars are much larger than others, mother; is it because they are actually larger, or because they are nearer to us?"

"It was formerly thought that all the stars were about the size of the sun; and the reason why some appeared brighter and larger than others, was because they were nearer to us; but it has been found that Sirius, the brightest star in the heavens, and which was formerly considered the nearest, is much farther off than many of the smaller ones."

"How far off is the nearest star, mother?"

"Centauri is said to be the nearest; but it would take a cannon ball, going at the rate of 500 miles an hour, four millions of years to reach it."

"If the nearest is so distant, mother, I cannot conceive how far the most remote would be?"

"No, Clara; your mind would be lost

in the contemplation. It is estimated, however, that light, which is eight minutes coming from the sun to us, would be thirty-seven years coming from Centauri; and 5000 coming from the most remote."

"Oh, dear mother! the more we examine it, the more grand and sublime this subject appears."

"You may well say so, my child; and this is only in reference to our own cluster or universe; how inconceivably grand then must it be, when we think of the thousands of clusters that lie far away from our own, in the boundless regions of space. Here we are again at home, and I suppose neither of us will regret our evening's walk."

"I shall not, mother, I know; for I shall, in future, view the stars with much more interest than I have done heretofore."

NUMERICAL COINCIDENCES.

THE marriage of Louis XIII. of France, with the princess Ann of Austria, met with many obstacles, but was ultimately brought about in consequence of the following weighty considerations.

The name of Louis, or according to the ancient orthography, Loys de Bourbon, contained thirteen letters; he was in the thirteenth year of his age; and he was the thirteenth King of France of the name of Louis. The Princess Anne d'Autriche had also thirteen letters in her name; she too was in her thirteenth year; and there were thirteen princesses of the same name in the House of Spain. Nay, more, Louis and Anne were born on the same day, of the same month, of the same year. In short, nothing could be more obvious than that they were born for each other!

Nothing was more common in former times than such puerile combinations of circumstances. Similar to the above was the play on the number fourteen, as connected with the life of Henry the Fourth. He was born in the fourteenth century, fourteen years and fourteen decades after Jesus Christ; he came into the world on the fourteenth of December, and left it on the fourteenth of May; he lived four times fourteen years, four times fourteen days, and fourteen weeks; and there were fourteen letters in his name, Henri de Bourbon.

EASTERN RAMBLES AND REMINISCENCES.

RAMBLE THE NINETEENTH.

EGYPT—A DREAM—FIRST VIEW OF ITS SHORES
—WAKING REALITY—THE PILOT—ENTRANCE
TO THE HARBOUR—EGYPTIAN MEN-OF-WAR
—LANDING AT ALEXANDRIA—THE STREETS
—CLEOPATRA'S NEEDLE AND POMPEY'S
PILLAR.

"There's a calm on the breast of the musical
wavelets ;

The sun smiles amid the blue skies ;

The dolphins are playing, the flying-fish straying,
The petrels no more on the green billows
rise."—ANONYMOUS.

"Throngs! I see ye on the strand,
As the steamer nears the land ;
Some might Fortune's favourites seem
Borne on pride or pleasure's stream ;
Others, marked by weary care,
Labour's rugged livery wear."

MRS. SIGOURNEY.

"But whoso entereth within this town,
That, sheening far, celestial, seems to be,
Disconsolate will wander up and down
'Mid many things unsightly to strange e'e ;
For hut and palace show like filthily :
The dingy denizens are reared in dirt ;
Ne personage of high or mean degree
Doth care for cleanliness of surtout, or shirt,
Though shent with Egypt's plague, unkempt,
unwash'd, unhurt."

BYRON'S CHILDE HAROLD.

"LAND A-HEAD!" was shouted by the look-
out man, just as morning dawned; and had
I not anticipated something grand and
almost sublime in the first view of Egypt,
I think that it is probable the announce-
ment would have been disregarded on my
part; for what with the heat, the musqui-
toes, the noise, and the anxiety to get the
first glimpse of its shores, my slumbers
were anything but sweet and refreshing.

I had mused and wondered, and mused
again, until my imagination pictured Egypt
in the most extravagant manner, and, there-
fore, it is not to be wondered at, that as I
tossed about in my hammock, my dreams
were of its palaces, its obelisks, and its
colossal statues. Mighty sphinxes, with
severe aspect and outstretched jaws, guarded
the sacred river, and frowned upon those
that dared to approach its alluvial banks;
towering obelisks lined its streets, like
modern lamp-posts; each house was a
palace, guarded by colossal figures with
clenched fists, and long, night-caps like
silly-bags, that seemed ready to start from

the doorways after the offending being that
intruded upon them. Then, I wandered in
halls deserted—lined by pillars with ugly
capitals, and figure-inscribed ceilings—
their very walls covered with quaint and
stiff figures, and their floors with dazzling
mosaics. Then, methought, I sailed upon
the Nile, and gazed upon high-built tem-
ples, marbled cities, and pyramids, where
the sacred Ibis dwelt, and Apis was wor-
shipped with all the pomp and splendour
of the age. There, priests with sacred
wands and torches minister to the sound of
silver cymbals; and here the sacred lotus-
flowers crown the holy stream that glides
among feathery palm-trees, and innumera-
ble villages peopled by a race that wor-
ship dogs, cats, owls, beetles, crocodiles,
and apes.

"Who has not heard, where Egypt's realms are
named,

What monster gods her frantic sons have
framed?

Here, this gorged with well-grown serpents;
there,

The Crocodile commands religious fear.

Through towns, Diana's power neglected lies,

Where to her dogs aspiring temples rise;

And should you leeks or onions eat, no time

Would expiate the sacrilegious crime.

Religious nations sure, and blest abodes,

Where every orchard is o'errun with gods!"

There before us, and on our starboard
quarter, was a low sandy shore, so low I
could scarce discern it was land; and all
the expanse was sandy and low—no tower-
ing obelisks or mighty sphinxes broke the
monotonous line of coast. Is this then
Egypt, the scene of my dreams! this mis-
erable-looking shoal, as it were, in the bosom
of the sea? Adieu, ye pride of pomp, and
solemn scenes, if this is all thy land can
boast of!

Ah! now I see some windmills! come,
that is rather more cheering, especially as
there is a row of them, and their sails are
whirling round at a tolerable rate—but still
this is modern: it does not look like *my*
Egypt—yet again I say it is cheering,
because it looks lively. Now there is the
Arabs' Tower, standing upon a little eleva-
tion, and the new lighthouse on the penin-
sular of Pharos, which was once an island;
—yes, and there is Pompey's Pillar at last,
rising behind the windmills, and a forest of
masts between us and the town of Alex-
andria.

The gun that we have just fired is a sig-

nal for a pilot—and sure enough, here he comes in his huge boat, with a dirty latteen sail, and smoking his pipe in the stern-sheets as unconcerned as if piloting a ship was nothing at all; but it is no easy matter for us sailors to get into the harbour of Alexandria without the assistance of a pilot, because the entrance is so narrow and rocky. He is a queer-looking man, with one eye, and is dressed in a dirty cloth jacket, and blue cotton trowsers confined round the body by a coloured shawl, in which his knife is stuck, ready for anything from a sheep's throat to a Christian's heart, or a piece of spun-yarn. His head—and such a head—is covered with a greasy *tarboosh*, or skull-cap of red cloth, with a blue silk tassel hanging from the crown; and his feet are encased in red morocco shoes, turning up at the toes. As the boat comes nearer we can see his bare legs peeping out from underneath the folds of his trowsers as he squats in the stern of the boat, and his one eye wandering restlessly over the line of heads that are ranged along our ship's side. Phew! there's a rage he is in—the boy in the boat has done something wrong; see how he beats him with the tiller, and calls him all sorts of names, among which it is not difficult to hear—"Hhansir kebeer!" (great pig); "Hhamâr!" (ass); "Quôbti!" (a copt); "Gemêl megnoun!" (mad camel, a very reproachful term; "Fîl" (elephant); "Kelb!" (dog); mixed with a perfect torrent of words from which I can just catch those of "môkdaf" (an oar), and "bâhhrîeh" (sailing); and by his gesture therefore conclude that all this row is because the boy did not get out the oars and pull the boat, as she was not sailing fast. It is truly astonishing to witness these people at times receiving misfortunes with the utmost calmness of demeanour, while a mere trifle will raise such a tornado of passions in them, that even Mohammed could scarce quell. Only let an unlucky slave bring in a nargehel that does not draw well; or sneeze, or cough, so as to disturb a reverie; or commit some such trifling error, and if he escapes blows, he may bless his stars and Mahommed, and make up his mind to be pretty well abused, and called everything that is thought degrading, from a dog to an elephant, or a Copt to an infidel (Christian.)

At last old Zaïn-el-Abedin (the star or ornament of the devout) stands upon the deck, and after making a most profound salam to the captain, he takes his station aft and communicates his directions to the master. Poor fellow! he has got among a sad lot, for those midshipmen around him are mischievous fellows. Already his *tarboosh* is doomed, and his pipe has received a fresh supply of tobacco and gunpowder covered with stale ashes, while he has gone forward to see the channel is clear. Back he comes, and takes his pipe to muse again. He draws and puffs; it is no use. He thinks it has gone out, so he strikes a lucifer-match against his heel, and applies it to the pipe-bowl, giving a most vigorous draw at the same time. The gunpowder ignites and jerks the old man's head back with a force that no doubt he remembers to this very day, if he is alive; and he vents his indignation on the laughing mid's, by a volley of abuse in Arabic, which only makes them laugh the more. Presently, the sly old fox calls one of them to him, and whispers a word in his ear; the midshipman nods his head and dives below, the old man muttering "*taib, taib keteer*" (good, very good), and looking as delighted as it is possible to fancy he could look, strokes his beard, and again says "*taib*." The mystery is soon solved; the midshipman appears with a glass of grog; and the old man having proved to his satisfaction that it is a very comfortable one, returns the glass and says—"Room, vary taib! bono! multo bono! Inglesi vary taib! me multo-taib!" Each ejaculation in praise of the rum, the English, and himself, being accompanied by a nod, a wink of his one eye, and a slap on his girdle, which really was so extremely ludicrous that it was impossible to help laughing.

Presently we passed Marrabut, a battery erected by the viceroy on a miserable rock of sandstone, and soon afterwards entered the harbour of Alexandria, and dropped our anchor close to the Egyptian fleet, which was moored near the entrance. It consisted of ten line-of-battle ships, two frigates, two steamers, and several small craft; and the harbour also contained several merchantmen of all nations, and plenty of caiques, and boats.

It was a curious sight to see the red flag of the Star and Crescent, mingled with



the star and stripes, and "that flag which has braved a thousand years, the battle and the breeze," floating amidst a forest of masts; the round sterns of the Egyptian vessels contrasting with our square ones; their sentries pacing the deck with dirty white cotton trowsers, that were too full to be mistaken for English, and too scanty for Egyptians, and their red *tarbooshes* and brown faces leaving no doubt as to their country; while the slovenly manner they "carried arms" as an officer came alongside, formed a strong contrast to the neat blue woollen cap of the English marine, with the leathern peak (now abolished), and the smart rap that announced he had "carried arms."

As soon as the quarantine officer had

been alongside, and satisfied himself that we could be allowed on shore, we jumped into a boat, and were soon pulling towards the quay.

When we landed it was mid-day, the heat intolerable, the confusion of tongues immense, and the collection of donkeys and one-eyed boys prodigious. It seemed to be quite an event to see some English again—a treat they had not experienced for at least five days, when the Oriental Company's vessel disgorged their cargo for India, and left the donkey-drivers to employ their time as they choose best. In addition to the greeting we received from the bipeds and quadrupeds, we were beset with swarms of flies that gave us no peace.

In vain we protested that we would walk to the English hotel—it was no use. We heard—"I say, master, mine good juck-ass!" and then rush would come a donkey on one side, which we beat off with our cow-canes, and while doing so we were bundled on to one of the beasts amid yells of broken English and Arabic oaths from the disappointed boys, who looked out for other victims.

On we went jostling, trotting, and

jingling along the narrow streets, so gloomy and dirty that we almost fancied they were plague-infected. Now we frightened a crowd of small boys by our shouts; for Englishmen never ride quietly; then we paused at the stall of a tobacco-merchant to get a supply for the smokers of the party; and finally had a race to the shop of a confectioner to taste the Egyptian sweets.

The old man was sitting at the door of the shed, smoking his pipe and resting his elbow upon the low table where his sweets were exposed for sale. Before him was a basket of oranges and a water-bottle, and I thought, as I sat on my donkey and looked upon that old man's face, with its placid expression, surrounded by so many picturesque objects, that I had never seen anything more fit for a sketch; so taking out my pencil I drew the one from which the engraving is executed at the head of this Ramble.

After riding through the town we arrived at a lot of mud huts, and there, in the centre of a heap of rubbish, stood a tall block of red granite.

Then this is Cleopatra's Needle, about which we have heard and read so much! and the prostrate one is another of these curiosities. For my own part, notwithstanding that I admire all that is beautiful and great (I do not mean huge), it would take a long time to make me take a fancy to one of these pet needles.

The erect obelisk is 68 feet high, 7 feet square at the top, and 8 feet at the base. The fallen one is 64 feet, its base is 8 feet square, and its weight about 240 tons.

Obelisks* are purely of Egyptian origin, and were placed before buildings, in pairs, as historical records, to let people know when, by whom, and for what purposes the buildings were erected. They are generally cut out of granite, and have always been found on the eastern banks of the Nile, while the pyramids are always found on the western banks; the former being considered by Bonomi to be symbolical of the rising sun, and therefore, used as decorations for the habitations of the living; and the latter as symbolical of the setting sun, and consequently prove appropriate for the cities of the dead.

* The term obelisk is said to be derived from the Latin *Obeliscus*, from the Greek *Oselos*, (οσελος), which means a spit.

The learned in these matters, tells us that the hieroglyphics on them state that they were originally cut at the granite quarries of Syene, in Upper Egypt, by Thothmosis III., a celebrated monarch of Egypt and Ethiopia. All we can say about the matter—that is, to those who are not learned in the knowledge of the figures of half sleepy looking eyes, half starved looking arms, fat beetles, enlarged colons, ugly geese, quaint pitchers, angular dogs, plethoric magnified leeches, pot-hooks, hangers, and a variety of other extremely bad outline figures, called denotic and hieroglyphic—is, that there are three lines of inscriptions on each face of each obelisk, cut into the granite to the depth of 2½ inches. The *savans* say, that the central inscriptions were sculptured by Thothmosis III.; if so, I hope that he relished the amusement and labour, for it must have been precious hot work, to say the least of it, and not very satisfactory when finished; and they also tell us that a very celebrated monarch named Sesostris, or more properly Rameses II., added the lateral inscriptions. Now a great deal has been said and written lately about transporting the fallen obelisk to England, which every one knows was given to the English a long time ago (1820), by Mehemet Ali, the late Pasha of Egypt—a generous gift on his part, truly, considering that we took it in battle. The fact is, the obelisk weighs 240 tons, and its removal would cost the nation £15,000, or even more; and after all it really is not worth looking at, much less having, unless to macadamise the roads. It is well to say that “as a relic of ancient art, as a memorial of two of the most renowned monarchs of Egypt, and as a trophy of British valour, this obelisk is without a parallel.” It sounds well, and perhaps there is something about valour that strikes home to English hearts—I used to think so, until I saw the Nelson Monument in Trafalgar Square, like another Pompey's Pillar misplaced, and a sad memorial.

But we must really get away from this place, and scamper over the hillocks of mud, to Pompey's Pillar; for the heat is oppressive, the flies troublesome, and the children clamorous for *backsheesh* (presents.)

Bang goes the stick upon the donkey,

and away I trot to the jingle of an old chain around his neck; the children run until out of breath, and after a little trouble in guiding my quadruped through lanes of mud huts, where misery in nearly every shape presented itself, I have arrived at the base of the mound upon which the huge pillar stands. What a contrast to see that beautiful pillar, and capital of the Corinthian order towering above all around, and the rough pedestal desecrated by the name of W. Thomson, of Sunderland, in letters at least 10 inches long! If people do not feel any taste for the curiosities they are shown, that is no reason they should destroy the romance of the thing by such acts of vandalism. Who, indeed, could indulge in antiquarian reveries with such a romance-destroying name before their eyes?

The capital of Pompey's Pillar is 10 feet $4\frac{3}{4}$ inches high, the shaft 67 feet 8 inches, and the base and pedestal are 21 feet 4 inches.

Leaving this relic, we then returned to the town, and entered the English Hotel.

PORES OF THE HUMAN BODY.

THE skin of the human body is a very curious object for the microscope. By cutting a thin piece with a very sharp pen-knife or razor, and applying it to a good microscope, a multitude of small pores will be seen, through which the perspirable matter is supposed to be perpetually transmitted. These are best seen in the under or second skin. There are said to be 1000 pores in the length of an inch; and of course, in a surface an inch square there will be 1,000,000, through which, either the sensible or insensible perspiration is continually issuing.

If there are 1,000,000 pores in every square inch, the following calculation is made of the number contained in the whole body:—

The surface of the body of a middle sized person, is reckoned to contain 14 feet; and, as each foot contains 144 inches, the number of pores will be estimated at $1,000,000 \times 144 \times 14 = 2,016,000,000$, or two thousand and sixteen millions.

INTERNAL HEAT OF THE EARTH.

VOLCANOES.—There are three hundred volcanoes on our globe, and these are scattered over every side of it. If we take a round ball, and mark on its outside three hundred dots, we shall perceive that the ball is very thickly dotted over. So with our earth; on every side it is pierced with some of these three hundred openings, through which the fiery interior shines out most brilliantly. Often its molten contents are expelled, to the terror of thousands of our fellow-men.

The large number of volcanoes, their huge streams of lava, and the lofty mountains they have thrown up, announce that the amount of heat in the interior of our earth is most intense, widely diffused, and almost beyond our conception.

EXTINCT VOLCANOES.—The number of extinct volcanoes is far greater than the present active ones. In North America, along the whole line of the Rocky Mountains, and through the West Indies, they stand thickly, as monuments of the past. Their craters are as symmetrically formed, and they exhibit the same lava streams, though in a hardened state, as those now burning.

In Germany, along the Rhine, travellers speak of "the castled crag of Drachenfels," the Eipel, and many others, presenting the same phenomenon. The centre of France is studded with them, especially about Clermont.

In Italy, the town of Cumea, founded a thousand years before the Christian era, is built in the centre of a volcano. There, in a space of sixty miles in length by ten in breadth, are sixty extinct craters, one of which is two miles in diameter. All these with others in every quarter of the globe, should be joined with the three hundred that are now burning, and we should have full proof of the fiery wonders in the interior of our globe.

EARTHQUAKES.—The causes of earthquakes are the same as those of volcanoes. This we know, for all their phenomena are the same. First, there are strange, alarming noises from beneath, then a quaking of the ground, often risings and fallings of the surface, like long waves of the sea, then violent rents in the solid surface of the earth,

then emissions of flames, vapours, smoke, and melted rocks.

If, after a few weeks, all ceases, and the natural calm follows, then we say there has been an earthquake; but if the emissions last a while longer, then we say a volcano. Often men doubt whether to call the phenomenon a short volcano or a prolonged earthquake.

There are every conceivable gradation and intermixture among these phenomena, and the interior heat of our planet in some way produces both these classes of terrific wonders. Permanent volcanoes are indeed thickly set around the globe, but not in every district. Earthquakes, however, occur in every region, and hence they reveal the great fact that the internal heat of our globe is glowing beneath every spot of ground wherever we may tread.

HOT SPRINGS.—Hot springs occur in every country on the globe. They abound most among mountains, because there the crust of the earth has been broken and elevated, and a more ready escape for the internal heat has been formed. Hence, in the United States, they boil up most numerous among the Alleghanies, Ozark, and Rocky Mountains.

In Europe, they mostly rise out of the Alps, the Pyrenees, and the Apennines. Sometimes they spring up from level plains. It is the same in Asia, Africa, Oceanica, and both the Americas. They are hottest when volcanoes are most active, sometimes reaching the boiling point, though in all cases they must be greatly cooled by the waters and the rocks near the surface. The great number of these, and their universal diffusion, prove also the universality of the internal heat of our globe.

ARTESIAN WELLS.—Artesian Wells are made by boring into the earth, till the instrument reaches water, which, from internal pressure, flows spontaneously like a fountain. They are so called because this mode of obtaining water was first practised in a district of France called Artois. These wells may now be found in almost every country, and they often extend several hundred feet into the earth for the purpose of obtaining a copious stream.

They are usually but a few inches wide, and a tube is sunk all the way down to prevent the water from escaping at the sides. The water which boils up from these wells

is always warm. At Wurtemberg, in Germany, they are used to warm the water which drives factories; and this prevents their stopping by ice in the winter. The same is the case in Alsace.

In China, Artesian Wells are not uncommon. And everywhere the deeper they are sunk, the warmer is the water they bring up. These furnish an additional proof of the universality of the interior heat of our planet.

DEEP MINES—After descending about forty feet, the temperature of the earth remains the same both in summer and winter; below that depth it becomes warmer as we descend. This increase of heat as we go downward, advances with perfect regularity. On an average, around the globe, the increase is one degree of Fahrenheit for every fifty feet.

At the bottom of the mines in Cornwall, England, the thermometer stands at eighty-eight degrees. This is twelve hundred feet below the surface, and much warmer than summer weather in that country.

We can conceive of nothing to stop this advance of heat in the direction toward the centre of the earth, and if it continues to increase according to the ascertained average rate, then all known substances must be in a melted condition at a distance of twenty miles below the surface of the earth. At this rate we must cease wondering at the numerous earthquakes and volcanoes, for the crust of the earth must be a mere shell, resting on a molten fluid.

Earthy materials are non-conductors, therefore, this internal heat cannot escape, or affect us at the surface. In the same manner, streams and pools of lava become cool and hardened on the surface, and thus their heat is confined, and the interior remains many years in a fluid state.

THE PRESENT MOMENT.—There is no moment like the present. Not only so, but, moreover, there is no moment at all—that is, no instant force and energy, but in the present. The man who will not execute his resolutions when they are fresh upon him, can have no hope from them afterwards; they will be dissipated, lost, and perish in the hurry and skurry of the world, or sunk in the slough of indolence.

EVAPORATION OF WATER AND FORMATION OF DEW.

WE can scarcely estimate sufficiently the benefits of the sun's rays playing on the surface of the ground. To it are we indebted for the "gentle dew from heaven," the genial shower, the underground springs, and the rolling river. But for the sun, the world would be one universal Sahara, untenanted by a single plant. The whole of the waters of the globe would be concentrated into one spot, and no lakes, rivers, or inland seas of any magnitude would exist. Wherever it shines brightest, there exist the greatest amount of vegetation, and the largest rivers on the globe.

The action of the sun upon the waters of the tropical seas contributes to these results. Shining with intense heat, and aided by the cooling winds, it raises a large quantity of watery vapour, which is carried up by the currents of air to the higher regions of the atmosphere, where it floats in the form of clouds. These are drifted north and south in various directions, and scattered overhead in the temperate zones. It is only in the torrid zone that this process of cloud-forming is carried on at all periods of the year; in the more temperate climes it is confined to summer seasons.

In the Polar regions no clouds are formed, because the water is nearly always solid, and the air is so cold as to convert any portion of water into snow or ice almost immediately. The coldness of the air is sometimes produced in temperate latitudes by a current from the poles rushing suddenly southward, and cooling the air it forces through. When it is thus cooled below the point at which it can sustain a cloud, the latter immediately falls as rain. The approach of two clouds charged with electricity produces a like result, and rain is also produced by a cloud touching a mountain top or side.

Dew is the vapour of water precipitated during the night, in little drops, upon the surface of plants and other bodies, and it takes place oftenest when the sky is serene and cloudless. The older alchemists regarded it with interest, as an exudation from the stars, in which they hoped to find gold. Others believed it was a kind of rain which ascended from the earth. After

the deposition of dew, if the sky should become cloudy, the little drops of water will rapidly disappear.

Dews are more frequent on the coast than in the interior; and in the central parts of Asia and Africa they scarcely ever occur. They are produced by a lowering of the temperature of the beds of air which are in immediate contact with the ground, and the substances covered are always those which are colder than the surrounding air, or than those bodies on which no deposit takes place.

In fact, dew is a deposit of water previously existing in the air as vapour, and which loses its gaseous form only in consequence of being chilled by contact with colder bodies. The same principles are observed in the well-known phenomenon, when a glass or pitcher containing very cold water becomes wet on the outside, by the cooling of the vapour of the surrounding air. This phenomenon, by some is erroneously attributed to the "sweating" of the vessel. To ascertain the cause of the phenomenon of dew, it is necessary to discover the cause of the reduction of temperature.

Every body in nature is constantly receiving rays of heat from other bodies, and giving them off or radiating them in turn; and the temperature of any body can only remain stationary when it receives from surrounding objects as many rays as it emits. If a substance be so situated that its own radiation may continue uninterrupted, without an equivalent being returned to it, its temperature must necessarily fall. Such is believed to be the condition of the ground on a starlight evening.

The heating rays which are emitted on such an evening, from substances on the surface of the earth, are dispersed into the air and are lost in free space. Nothing is present in the atmosphere to exchange rays with them, and their temperature consequently lowers. If, on the contrary, the weather be cloudy, the radiant heat proceeding from the earth is intercepted by the clouds, an interchange is established, and the ground retains nearly, if not quite, the same temperature as the adjacent portions of air.

When the bodies on the earth's surface have become cooled in the way described,

the air which surrounds them becomes cooled also, and deposits its watery vapour on the colder bodies. On cloudless nights every substance does not radiate heat equally well, and become proportionably cold. Bodies with sharp points effect this purpose best; such as grass, wood, the leaves of plants, and filamentous substances in general. These will reduce the temperature ten and even fifteen degrees below that of the surrounding air; while bodies which are imperfect radiators, such as polished metal or smooth stone, are hardly ever moistened, and scarcely below the temperature of the air about them; consequently no dew is deposited on them.

OXYGEN:

ITS PROPERTIES, DIFFUSION, AND RELATIONS TO LIFE.

BY E. L. YOUMANS.

OXYGEN is the most important of the elements. It is in some way concerned in nearly all chemical changes, and in most of them it takes a very prominent share. The condition of oxygen is that of a gas; that is, it resembles common air, which is a mixture of several gases. Some gases, when exposed to great cold, are brought down to the liquid, and even the solid state; and others are condensed into liquids by pressure: but no degree of cold or pressure ever yet applied has been able to overcome or destroy the gaseous properties of oxygen; chemical force alone can do this.

Oxygen is transparent, colourless, tasteless, and inodorous, like common air; it is about one-tenth heavier than that body, and possesses the same mechanical properties. It acts neither as an acid nor an alkali, and is dissolved sparingly by water, one hundred gallons absorbing about four and a half of the gas.

The term oxygen signifies acid-former. It was applied by Lavoisier, who supposed it to be the active principle of all acids, an opinion now known to be false. There is reason to believe that oxygen is capable of existing in two atmospheric states, a passive or quiescent state, and an active condition, in which its affinities are greatly exalted. The *ozone*, discovered in the atmosphere, by Prof. Schonbein, concern-

ing which much has been said, is supposed to be the active form of oxygen.

The leading property of oxygen is the intense energy with which it unites with other substances. So vehement is this action that fire is produced, and hence oxygen is the great supporter of combustion. All substances which burn in the air, burn in pure oxygen gas with greatly increased brilliancy. An extinguished candle plunged into it is instantly relighted if the least spark of fire remain upon the wick. Iron wire burns in it with vivid scintillations, and phosphorus with a light so brilliant that the eyes cannot endure it.

In all these cases the light and heat are produced by the chemical union of the oxygen with the burning body, the weight of which is increased exactly in proportion to the amount of oxygen consumed. All the common cases of combustion which take place in the air, are due to the same cause—the combination of its oxygen with combustible substances. It here proceeds in a more subdued and regulated way, because atmospheric oxygen is diluted with four times its bulk of another gas, which, if taken alone, extinguishes fire altogether.

Oxygen is by far the most widely diffused of all the elements. It constitutes one-fifth, by weight, of the atmosphere, eight-ninths of the ocean and all other waters, nearly one-half of the solid rocks that compose the crust of the globe—of every solid substance we see around us, the houses in which we live, the stones and soils upon which we tread, and much more than one-half of the bodies of all living animals and plants.

The discovery of oxygen was made by Dr. Priestley, in 1774, and it has been justly pronounced the “capital discovery of the last century, rivalling in importance the great discovery of gravitation, by Newton, in the preceding century.” It disclosed the phenomena of nature in an entirely new aspect, exploded the old theories, and laid the foundations of modern chemical science.

It has a very wide range of combination; uniting with all the elements except fluorine, forming compounds termed oxides. The act of combination is called *oxidation*; the separation of oxygen from a compound is termed *deoxidation*. The affinity of oxygen is exerted at low temperatures as well as

high ones; its activity never ceases. It exists in a free state throughout the atmosphere which envelopes the globe, and is in constant contact with all forms of matter; attacking everything with which it is not already combined.

This slow combustion, though unaccompanied by light, is always attended with heat, although it may not be in sufficient quantity to be measured. An ounce of iron rusted in the air, or burnt in oxygen gas, produces exactly the same amount of heat in both cases; the difference being, that in the former instance the heat is developed so slowly as to take years, while in the latter case the same effect is produced in as many minutes.

The cause of decay in vegetable and animal substances is the action of oxygen upon the elements of which they consist. They are oxidized, or undergo a slow combustion, called by Liebig *eremacausis*, which breaks them up into similar and more permanent compounds.

Oxidization is also the grand process by which air, earth, and sea are cleansed and purified from innumerable contaminations. Putrid vapours and pestilential effluvia are destroyed by a process of burning, more slow, indeed, but as really as if it were done in a furnace. The offensive impurities which constantly pour into rivers, lakes, and oceans, are perpetually oxidized by the dissolved gas, and the water is thus kept pure and sweet. This is the reason why waters that have become foul and putrid by absence of air, are sweetened and purified when freely exposed to its action.

The most interesting relations of oxygen are to the animal kingdom. It is the universal supporter of respiration; and, as this is a vital process, it is a supporter of life. The lungs of land animals, and the gills of fish, are both adapted to the same purpose—to absorb oxygen; the one from the air, the other from water.

An animal confined in a given bulk of air, having consumed its oxygen, dies. If confined in the same bulk of free oxygen, it lives about thrice as long, and more than ten times as fast. A mouse placed in a jar of oxygen, breathes very quickly, becomes highly excited, and springs about with the greatest activity. But the effect is too powerful; over-action, fever, and in a short time death, are the result.

The chemical action that here takes place is simple oxidation, the same that occurs in the open combustion of fuel, except in a less intense degree. The oxygen combines with the elements of the body, oxidizing or burning them, and the products of the combustion pass from the system by the various channels.

Its action upon the living system is the same as upon dead matter, purely destructive. It enters the lungs, is absorbed by the blood, and carried to every part where blood-vessels are to be found. Every organ, tissue, muscle, nerve, and membrane, is wasted away, burnt to poisonous gases and ashes, and thrown from the system as dead and useless matter; and if these constant losses are not repaired by the due supply of food, emaciation ensues. The fat being most combustible, is burnt first; the muscles then soften, shrink, and decay; and lastly, the brain is attacked, delirium results, and life ceases. This is called starvation: it is oxidation, absolute burning to death.

The chemical properties of oxygen are a source of power, which is made use of to produce the greatest mechanical effects. When we say that the affinities of oxygen are energetic, it is meant that, in combining with bodies, it gives rise to vast force. A bushel of coals properly consumed in a steam-engine, produces a power sufficient to raise 70 millions of pounds weight a foot high. The origin of this prodigious force is the chemical union of almost 200 pounds of oxygen with the carbon of the coal. Oxidation, or the affinity of oxygen for the elements of fuel, is thus the ultimate source of all steam power.

Electric currents and the force of electro-magnetism are caused by the combination of oxygen with the metals of the galvanic battery: and in proportion to the activity of this chemical action is the intensity of the effect. In like manner, all muscular force in animals is produced by the oxidation of carbon and hydrogen within the living system. Every stroke of the piston, every telegraphic transmission, every motion of the hand, is an exhibition of force which began in chemical changes. Cut off the supply of oxygen, and the steam-engine comes to rest, the galvanic-battery ceases to act, and the animal dies.

REVIEW.

Walks Abroad, and Evenings at Home; a Journal of the Beautiful in Nature, and the Entertaining in Science. London: J. Bennett, 69, Fleet Street.

IN this new candidate for public favour, the *Tutor* recognises at once a co-operator and a competitor. A co-operator in the diffusion of knowledge by that easy and familiar method which renders it doubly pleasing; and a competitor in the excellence of its style, and the cheapness of its price. It differs, however, in some distinguishing features from both the *Tutor* and the *Friend*, and is a link between them. It is not so domestic as the *Friend*, nor so educational as the *Tutor*; yet it is singularly instructive and pleasing. The chief attraction in this first Number, apart from a steel plate which is given as an extra inducement to subscribers, is a fairy-like story, entitled "The Adventures of Prince Pretty in the World of Insect Wonders." By this story the startling truths of entomology are conveyed in a captivating manner, and many sound morals are deduced from examples in the insect world. Prince Pretty is not exactly a fairy, with powers to effect magic transformations—he is a creature born of Poesy. The story runs thus:—

"A POET sat by the window of a Palace. It was not a palace wrought out of costly marble, having Corinthian pillars, and domes, and works of statuary in its vestibule. There were no artificial lakes and fountains before it; no swans gliding upon the surface of still waters, from which leaped fish with golden sides; no peacocks spreading their beautiful feathers to be fanned by the gentle breeze. But it was a palace—a small edifice—so small that it was completely hidden by trees that clustered round it, and seemed to hold it in their arms. From its thatched roof hung many a loose straw, for the sparrows built their nests therein; and those who looked up to the old chimney might see the martins flitting in and out; that chimney had long been known to them, and many a young bird had been hatched near the spot whence its white smoke ascended in graceful curls. The Poet was a poor man, if money constitutes wealth. He enjoyed plenty of gold in the flowers, in the plumage of birds, and in the clouds at sunset. But he had not in his purse the thing which men call gold, and which they worship with profound superstition. No rich repasts were spread within his palace. A cup of water and a crust of bread, with cresses from a neighbouring stream, often formed his simple fare. Yet he was happy,

and deemed himself rich. And thus contentment made to him a palace of what to others seemed a humble cottage.

"He was sitting by a window around which the honeysuckle climbed, and into which roses, both white and red, peeped with sweetest modesty; and as he looked out upon the beauties of nature, the thrush, the blackbird, and the goldfinch poured out their notes of rapturous melody. The Bee came by, humming its song of industry; the Butterfly alighted upon the rose's cheek, and displaying its beautiful wings, delighted the Poet's heart; and oft a Dragon-fly would dart along with rapid flight. The Poet meditated upon the vanity of the man who despises these wonderful works of God. He asked himself—has not the King of Nature clothed the Butterfly in rich attire which earthly queens, with all their wealth, cannot surpass? Has he not given to the Bee wings more delicate than silken texture, which bear her to and from her honeyed hive? and is not her body begirt with rings of gold and garments of velvet? And the Poet longed for the eyes of an insect, for an insect's little form and wings, that he might go forth and commune with these fair creatures, and mark their ways and works."

At length the Poet's imagination becoming more excited, he fancies that the insects find tongues which he can understand. The Dragon-fly, the Bee, and the Ant call him away to their abodes, and make large promises of the wonderful things they will show to him:—

"The poet heard many insects thus appeal to him; and he sat in meditation until the golden tints of evening fell upon the hill-tops and tipped the trees with a celestial beauty. And as the insects sped their way homewards, they called at the Poet's window, and again and again made great promise of the wonders they would show him if he became one of them. At length the grey twilight descended like a veil upon the reposing earth; and then there came to the Poet's window a new order of guests, the Moths with soft and silken down upon their wings, and stripes of silver and of gold, of velvet and of ermine upon their bodies. And with them came Beetles humming a drowsy song; and the Poet saw that their backs were guarded by plates as lustrous as diamonds and as rich as rubies. These all moved the Poet more and more to vivid imagination and strong desire; and when he heard the Cricket's voice appealing to him from his own hearth, he fell into a reverie in which he felt his very nature change. He became a tiny thing, smaller than his smallest finger had been. Before him lay a wardrobe composed of the wings and plumes of insects; there were also their weapons of defence, their instruments of labour, their breastplates, and their shields. Habiting himself in some of these, the Poet looked beautiful, and seemed almost to be an insect. He wore a cap taken from a Moth's head, and on it he placed two beautiful plumes. Around his body he wrapped a garment made of Butterflies' wings; and his pantaloons, which fitted tightly to his shape, were formed of the skins of Caterpillars, striped elegantly with green and gold. And thus Prince Pretty, the hero of the Poet's imagination, was born, and became invested with powers which

no human prince ever possessed. Laying himself down upon a leaf which rested upon the oriel, he was lulled to sleep by the song of the nightingale."

On the following morning Prince Pretty is aroused by the Bee at a very early hour. A large gathering of insects immediately takes place, and after a course of proceedings that are at once laughable

and instructive, in which a Snail and a Wasp have a very serious altercation, the Prince sets off upon the back of a Dragon-fly, to inspect an insect ocean, arrived at which the Dragon-fly set him down upon the leaf of a water-lily, and brought to him the cast-off cases of water insects that had undergone their final transformation. He



was thus provided with a bathing-dress, in which he is equipped in the illustration which we have selected for insertion. The third chapter tells the result of the Prince's first attempt at submarine investigations:—

"What are you hesitating about?" asked the Dragon-fly of the Prince, as the latter stood upon the brink of the leaf. "Are you afraid?"

"Afraid, I not I," replied the Prince. "Then why don't you plunge in?" asked the Dragon-fly.

"Not because I am afraid to do so," said the Prince, "but it strikes me as being dreadfully cold."

"Now, excuse me, Prince," said the Fly, "I have scarcely patience to look at you timidly wetting one toe and then another. Oh, I remember the time when I lived in that dear pond, how its cool waters laved around me, how every undulation of it bore me along, imparting a delightful feeling; and how I have hunted over its bed for game well worth the catching! If it were not for my wings, I feel that I could plunge down again, and be as young as ever in that home of my childhood! In, in, Prince!"

"It's all very well to cry 'In! in!' said the Prince. 'I have known stouter hearts than mine to quail before a cold bath. I have seen the hero of a mighty battle shrink from the touch of cold water.' He talked glibly of the delights of sea-bathing; of its bracing effects and sanitary results; but, as he drew near the water-side, his pace became slower, and he rested upon the sands, looking wistfully at the sea, and then turning and looking more wistfully at the shore. By slow degrees he disrobed, and then went down to meet the rippling waves with a waddling gait that would have disgraced a child of four years, and when the wave just kissed his feet, he caught one up, and then the other, as though he had been bitten by a snake. At length growing bold, he ventured in to his knees;—how they knocked together, and how his teeth chattered, while every rising wave sent forth from his chest a convulsive breath as though it were his last. Another bold resolution, and dipping his hand into the water, he wetted his nose and the locks of hair that seemed to stoop over his brow, thirsting to catch a drop of the refreshing element. He delighted to think that he had achieved a victory; he rushed back to the shore, and went home extolling sea-bathing to a party of friends, who confessed that they never dared to venture in. So you see, Dragon-fly, I am not the worst of the timid."

"But you are much like him," exclaimed the Dragon-fly; "let me give you a word of advice; whenever you take a bath, in at once; no dilly-dallying about it, but dash in, and after the first splash you are ripe for anything, and will love the water almost as the air. So now, Prince—"

"The sentence was unfinished when there was a little splash—the Prince had left the leaf."

"A moment afterwards, and an unusual commotion took place near the spot where the Prince had dived. The water was thrown up in small waves, and successive rings radiated from a troubled centre towards the shore. It was evident that something unexpected was taking place, for the Dragon-fly had counselled the Prince to seek the bottom at once, and to communicate first with the larvæ and pupæ of the Dragon-fly tribe. Why, then, this disturbance upon the face of the hitherto quiet water? The Dragon-fly watched the movement with intense anxiety, and presently he was alarmed at beholding one of the Prince's arms rising above and beating the water. He therefore flew to the spot, and was terrified to see that the Prince had been attacked by a number of insects, called from their well-known ferocity, "Water Devils."* One had seized the Prince by the neck, another by the arm, and two had hold of one of his legs; others were surrounding him and seeking opportunities to seize hold. In the greatest terror the Dragon-fly flew over the spot, and sought to alarm the Devils off by the shadow of his figure, but in vain. He even darted down upon the water and disturbed it, at the risk of destroying his wings, but all to no purpose. The unequal combat still waged, and it seemed evident that the Prince would fall a victim to his blood-thirsty assailants; when the thought occurred to the Dragon-fly to go to the margin of the water, and communicating the facts to a large number of the grubs and pupæ of his tribe, to send them to

the Prince's rescue. Not a moment was to be lost, for these junior members of his species were poor swimmers, and would take some time to reach the spot. However, he darted along, and fortunately succeeded in despatching a sufficient force of 'police of the D division,' as we may term them, and with great difficulty they succeeded in driving the Devils off, and rescuing the Prince from a terrible fate. They assisted the Prince to regain the leaf of the lily, and here he was rejoined by the Dragon-fly, who loosened his helmet, and did all in his power to resuscitate his exhausted frame.

"As soon as the Prince was sensible, the Dragon-fly most earnestly implored forgiveness for the offenders and for himself. 'I ought,' said he, 'to have sent intelligence beneath the waters of your arrival, and the resolution of the insects of the air to pay you homage and to hold your person sacred. But in my haste to show you the wonders of this insect ocean, I overlooked my duty, and the result was nearly fatal. These Devils are the scourge of our insect seas; they are the larvæ of a Beetle, and attack every living thing that comes near them, even of greater dimensions than themselves. They are voracious, and from morning till night they prey and gluttonise. They are not at all nice, and will devour with equal rapacity, a small fish, a tadpole, or any insect they can lay hold of. When their proper prey is scarce, they even attack each other, and so fierce are they, that if two are together a few hours only without food, a combat begins and never ends until one of them dies. They are armed with forceps in their heads, with which they seize their victims; and with smaller organs by which they suck their blood. They have large black eyes, which are distinctly visible, and when before a combat they stare at each other, their looks are almost hideous."

"The Prince heard and trembled. 'Luckily, I have escaped them,' said he. 'And really, Dragon-fly, I have no desire to renew the attempt. I should certainly like to succeed in my mission, yet who knows but that some other Devils may lie in wait for me, and that I may be devoured at last? I would not again be so attacked, for all the honey of the Bee or the beauty of the Butterfly."

"Let me prevail upon you, good Prince, to make one other attempt. That which you have undergone is a mishap that can be guarded against in the future. Let it rather stimulate you to fresh investigations, since it shows that in these little seas of our world, there are wonders to be explored, unknown, and unsurpassed. Great victories have always cost great dangers. Our insect life is one of constant peril, though we forget this fact, so great our bliss in the moments of our enjoyment, and when terror and death arrive, they come so instantly, that as we came unconsciously into life, so we depart from it. Birth is to us, as the bursting out of sunshine, and death seems but as the sudden gathering of a cloud."

"Well," said the Prince, "I will not be a coward. I will pursue my intention. But while I rest here, go and send intelligence to all the tribes of the waters, that I am coming, and let them know my prerogative." The Dragon-fly, rejoicing in this resolution of the Prince, started off to the water's edge, to despatch the necessary injunction. On his way, meeting with some Bees laden with honey, he directed them to the Prince, that he

* *Hydrophilus Piceus*.

might refresh himself. And soon the arrangements for the Prince's examination of the insect ocean were complete. His adventures and discoveries will be narrated hereafter."

Our pupils will, no doubt, have been interested in these adventures. The story of "Prince Pretty" promises to be as interesting as the "Arabian Nights' Entertainments," but with the former the lustre of fiction emanates from the flame of truth.

LOST HOURS.

ONE person rises in the morning at half-past nine, another at six. If each live to be fifty-years old, the one will have enjoyed sixty-three thousand, eight hundred, and seventy-five hours, or *two thousand, six hundred, and sixty-one days*, more than the other. Let us suppose, that there are throughout Great Britain, one million five hundred thousand persons, who rise at a quarter past nine, or later. Of these, perhaps, nine hundred and fifty thousand would, if they rose at six, be usefully employed. At this rate, fifty-six thousand, three hundred and forty-six millions eight hundred and seventy-five thousand hours, or six millions four hundred and thirty-two thousand two hundred and ninety-two years of individual improvement are lost to society, every half century. This is supposing, that these nine hundred and fifty thousand get up at a quarter past nine, whereas thousands do not leave their beds till eleven or twelve.

All this time is uninterrupted day, and composed of hours in which the intellect is far clearer and more fit for study, than the rest of the day.

It must be remembered, too, that nothing conduces more to health, and consequently to longevity, than early rising.

Suppose, out of the above number of persons, five hundred thousand should live four years longer than they otherwise would have done, viz. fifty-four years instead of fifty; according to the ratio above, here are *two millions* more years of actual existence utterly wasted.

MUCH adversity is requisite to make us hate life; a beckon from prosperity will recal this hatred instantly.

THE MIRROR OF NATURE.

(Continued from page 286.)

IN aid of the instinct, by which the animal is guided, come the peculiar form of those bodily members by which the inward impulse is able to express itself; this impulse fashions its appropriate organs. The instinct which leads the animal to its food, is served, in the bird that lives on flesh, by the swift wings with which it rushes on its prey, by the feet with talons, as well as by the beak for seizing and rending its food, and by the stomach and intestines in which the food is dissolved, and the vessels in which it is further prepared to nourish the various parts. Also, the spiritual impulse in man towards what is to be known, and to the fashioning of the same into an inner form of intelligent understanding, and making it the means of rational action, forms for itself its peculiar organ, *language*, the words of which are first an inward, super-sensuous element, and then are transformed into external and perceptible signs. The flight of the eagle, when it rushes on its prey, or of the swallow, when it traverses the ocean, is swift; but the language of human thought is incomparably swifter, for scarcely is the word thought or uttered, when the discerning spirit, upon the pinions of language, has reached the object of which the word is the sign; we are in spirit with a friend, whom we name, or in the places once visited and seen by us, although bodily we may be in a distant region of the earth. With the thought and the utterance of the word, the human spirit possesses at the same time the power of transforming what has been seen and felt bodily, into a being of a spiritual essence, which, as such, becomes its inalienable property, as imperishable as the spirit itself is.

If the moment that a bee comes forth in its perfect winged form into the light, it is placed under a glass, supplied abundantly with its means of nourishment, it cannot rest, but flies anxiously to and fro in its prison, and as soon as it is let out, it immediately uses its wings and other limbs in searching and collecting materials and in the construction of the nursery, which, with the other bees of the swarm, it prepares for the young brood. The innate force of the

human spirit likewise, like a higher kind of mechanical instinct, prompts man, without delay, to aid in the structure of a fabric, whose completion is the common work of all human beings—the construction of a language or speech intelligible to every individual. This is the mighty edifice in which long-gone generations have already laid up for us materials of thought and knowledge, and to which we also commit fruitful seed for the coming time.

The living power which rules in the nature of the bee cannot but exert itself; it must manifest itself in the formation of the wings and other parts of the insect, which the governing impulse toward gathering and building requires for its service. So also the rationally discerning and willing mind of man cannot do otherwise; it must form for itself a language for thought, and by means thereof comprehend the world of knowledge standing open before it, and by the communication of its thoughts to other human beings, work together with them in constructing the common fabric of knowledge. The soul of our poor deaf, dumb, and blind girl, resembled in its bodily limitations, through the want of the higher organs of sense, that bee, which at its first coming forth from the pupa state, is kept confined under a glass; this human spirit struggled eagerly to escape into the sphere of that free action, where it could obtain a language for its thoughts, so that it might receive knowledge from without, and communicate its own emotions to others.

When the human soul begins the work of forming an instrument for itself, partly spiritual and partly material, as this of language is, it follows, first of all, the course which the breath of the body takes. As breathing is an inhaling and exhaling of the vital element of the air, so speech establishes a receiving and giving out of the elements of knowledge. The impulse to speak, as essentially implanted in the mind as the impulse to breathe in the body, makes, on this account, common cause with its physical companion and copy: it avails itself of the voice to satisfy itself. Even the born deaf, who has never heard the human voice, feels himself prompted involuntarily to express his sensations and ideas by sounds. An individual born dumb, who had been so far taught that he could

make his thoughts known by words, said of himself that before he had learned words, he had always been impelled, in addition to the gestures by which he wished to distinguish individual objects, to use his voice, and that for every purpose that he knew, he had indeed, at first, had a certain utterance of the voice, or, as it were, a name, intelligible only to himself.

In the case of the blind Laura, this necessary connexion between the emotions and ideas of the mind and the voice, was observable in quite singular ways. When she entered a room in which were a number of her blind companions, she embraced every individual, giving at each greeting a peculiar sound, which the blind children, more attentive and practised than the seeing, learned to distinguish as readily as an articulate name. Even when she was alone and thinking of some one of her friends, whom she especially loved, she uttered an inarticulate sound, by which that friend was designated; and when she was asked why she did not express the name of a person she was thinking of, as well as the names of the objects of which she thought, by the finger-alphabet, she answered—"I do not think of printing her name, because I am thinking how much she loves me, and how much I love her."

The human being who possesses in the lowest degree the capacity of speech, the uninstructed deaf and dumb, for instance, is like the bird or other animals endowed with voice, that seek to express the feelings of bodily pleasure or pain, of love or dislike, of anger or terror, by tones of the voice; and even afterwards, after instruction, the organ of the voice at every lively emotion of the spirit, seeks to represent the truth, and be the herald of the affections.

In the case of the deaf and dumb, and even of the blind, the impulse of the human soul to speak, makes way for itself in another direction, through the language of gestures, which is just as instinctive as the movement of the hand towards the object which one wishes to clutch. Many birds, as the common starling, accompany the tones of their song with measured movements of the wings; some kinds of cranes are even moved, when they hear music in the neighbourhood of their cages, to dancing motions of their feet and wings. Such human beings as are outwardly defective,

not only the dumb but the blind also, can imitate no gestures which seeing persons make before them; they cannot learn their language of signs from others, and yet they invent for themselves a language of this sort perfectly adequate to all their wants. A blind person of Ostend, Anna Zimmermanns, was able to express herself so intelligibly by her language of gestures, that every seeing child understood her, and she was employed to make little purchases out of the house. Another, who had been blind from his birth, like Anna Zimmermanns, James Mitchell, the Scotchman, was able to relate little stories from the narrow circle of his experience, by the language of signs. Laura, too, conversed with persons who were ignorant of the finger alphabet, very fluently by gestures, and when strangers were introduced to her, her first question usually was, whether they were blind or could see, so that she might choose her method of communication accordingly. Besides, the countenance of this lovely child expressed, in the most striking manner, all her inward emotions, hope and fear, pleasure and pain, self-satisfaction and penitence.

Although even in the deaf and dumb and the blind, the discerning spirit is not destitute of the innate impulse, which prompts to the formation of speech, but manifests the same in a powerful manner, it happens with it in these cases, before a knowledge of words is obtained, as with a stray bee or the wasp, which is taken from its swarm, and put into confinement, where every thing else is provided for its life and activity. So long as the insect is vigorous, instinct shows itself still in the same way in which it acts in the swarm and the hive, but yet only very rudely; the little drops of honey are formed without object, scattered here and there; the wasp gnaws, indeed, the rotten wood, and works up its fibres to a substance resembling blotting-paper, but there comes no complete work from his labour. In language, which man in common with his fellow-men has received from the primeval times of his race, as a common inheritance, there reigns a spirit of universal, intelligent knowledge, which acts upon all human beings with an influence as animating and controlling as the power of the queen bee over all the bees of the hive. With language, a light rises upon

the darkness of human nature, which illuminates the whole external as well as the internal kingdom of creation. The wanderer who at night sees only a solitary tree or rock near him, beholds at once, when the day breaks upon him, the whole landscape with its woods, mountains, and rivers; he discerns its single parts as a harmonious whole, and feels himself now attracted and strengthened to join cheerfully in the common labours of humanity. So it is with the deaf and dumb, when he passes from the narrow circle of the language of signs, into the wide sphere of the language of words; and yet more striking than to him must be the benefits which the language of words bestow upon the deaf and blind.

We possess various accounts of deaf and dumb persons, who have learned to express themselves in written language, and without hearing themselves, even by word of mouth—accounts which inform us of their experiences in the process of developing the faculty of speech. They all unite in showing that the ideas which the uninstructed deaf and dumb possess in regard to the things and events of the outward world are in the highest degree partial and defective—that their ideas become so imperfectly the property of their minds that they can only dimly recollect them as dim passing outlines. "I can only faintly recollect," said an instructed deaf and dumb man, "in what way I used to think before I was introduced into the sanctuary of written language."

And how could this be otherwise? The impression made upon our senses becomes only thereby a spiritual thing, consistent with the nature of the spirit in this—that it fashions itself in the spoken or written word to a perceptible (rational) thought.

As the meaning of the word "think" can scarcely be explained to a deaf and dumb person who converses only by gestures, so is a clear train of thinking hardly possible to one who has only such signs instead of words. The impressions made on the senses, as they are comprehended by the untaught deaf and dumb, resemble in their relation to the inner nature (lower as well as higher) of men, the produce of the fields, which feed and fatten our herds. Those juicy turnips and cabbages by themselves could scarcely afford us any nourishment, but they become very nutritious when

they are converted into flesh and milk : a conversion, which is a type of what takes place with the experiences of the senses when they take the form of language in words.

And just this it is that the indwelling spirit in us seeks. It craves life as well as the body, and that it may live it needs its appropriate nourishment like the body. In a few rare cases, sight, and with it the beautiful vision of the world, has been by a successful operation bestowed upon the born blind ; but the delight then felt is incomparably less than that which fills the dumb and blind ; when upon such an one with the understanding and use of language dawns also the knowledge of a whole visible and invisible world, and gradually emerges into clear light. The case of Laura attests this. With the joy and eagerness of a man to whom, after long fasting, meat and drink is given, the spirit of this child seized the knowledge offered to it by the use of words.

Instruction in language is much more difficult in the case of a blind mute than in that of a deaf mute. When, for the latter, a word of several letters, as "tree," for instance, is written down, and the meaning of the word is defined by translating it into the language of signs, or by pointing to the object, which the word denotes, it often happens that the deaf and dumb pupil troubles himself to find a resemblance between the written word and the tree. An easier method of instructing such a pupil is, for the teacher to go through the formation of the word with the appropriate movements of lips, tongue, jaw, and windpipe, and to cause the pupil to imitate these motions, which he partly sees with his eyes and feels with his hands. The feeling, which the deaf mute experiences at the gradually increasing success of his attempts at imitation, impresses itself on his memory ; he learns at once to recal the same at will ; and when at last he articulates the word *tree* or *hand*, and the teacher signifies, by the language of signs or by pointing at the object, that he understands the word, then, with the use of speech, the mute learns at once both the object and meaning of speech.

How much harder is it for a blind deaf mute on the other hand, to guess at and understand the inner spiritual relation, in which the written word, formed with raised

letters and only palpable to the touch, stands to the object which it signifies. He may readily, at the pleasure of the teacher, lay the cards or plates together on which stands the raised word corresponding to the object, *book, bread, leaf*, and which have been placed under his fingers, but this employment appears to him a mere play, the use of which he does not understand, and which perhaps soon becomes irksome, as was the case with James Mitchell, whose education was not begun until his nineteenth year.

This danger did not befall the intelligent little Laura. When, for the first time, she placed the written word *key*, not alongside the key which had been previously used, but by another, never before used, and taken from the door, then a delighted expression of self-content appeared on her countenance ; the meaning and purpose of written signs as a means of understanding the thoughts of others, and of communicating one's thoughts, was now made clear to her ; a reflection of human intelligence beamed from her features.

That which comes forth wholly from the spirit, always appears to the bodily eye as a miracle, for it starts forth at once and stands perfect before us there, without our observing the hidden source from which it came ; it goes its way in many-sided activity through the material world without our seeing whither.

Such a daily miracle, repeated before every sound human child, is the apparition of human speech out of the single elements which the spirit receives from without. Who would undertake to teach grammar, and the combination of single words into intelligent speech, to a child possessed of all the senses, in order to render it capable of speaking perfectly ? And who would be able to do this in the case of a blind and deaf mute like Laura ? Nevertheless, in this little girl the same creative power of the spirit showed itself which we remark in our own perfectly formed children in the formation of speech, although it does not strike us in them, because we are apt to conclude that the remarkable modes of speaking with which they so often surprise us, have been caught from others. But this could not possibly be the case with Laura, when she at once put together words whose formation and meaning had been taught her by written signs and the move-

ments of the finger, and formed sentences which were perfectly intelligible, although wanting in many necessary words. Thus, when Dr. Howe had gone upon a journey to visit other institutions of education, Laura asked, "Are dumb boys and girls in the schools?" "Will Doctor be very tired?" And when her blind companions were talking with her, in the language of the fingers, of the approaching vacation, and of travelling then, she said to her teacher, "I must go to Hanover to see my mother, but now I shall be very weak to go so far; I will go to Halifax, if I can go with you; when Doctor is away, I will go with J——; when Doctor is at home, I cannot go, because he must not be alone, and if J—— is away, he cannot mend his clothes and take care of all things."

With the language of words, the peculiar language of the thoughts, man receives at the same time distinct, clear knowledge of himself, self-feeling and self-consciousness. Even this acquisition of the spirit, through the organ of communication which had become adapted to it, becomes apparent to us in the instance of Laura. Thus, one day this remarkable child said to her teacher, "Doctor will come in fourteen days, I think in my head;" and to the question whether she did not think in her heart, she answered, "No, I cannot think in the heart, I think in the head." When she was further asked why she did not think in the heart, she said, "I cannot know there; all little girls cannot know in the heart." On the contrary, she said, when she was once melancholy, "My heart is sad. When heart is sad, flows then blood?" Again, at another time, when, as it appeared, she was tired with learning, she put the remarkable question, "Why can I not stop thinking? Do you stop thinking? Does Harrison cease to think, as he is dead?" alluding to the President whose death was, at that time, a subject of conversation and lively sympathy among the children of the institution.

The movements of the spirit must necessarily awaken corresponding, kindred motions in the body associated with it. A lively child, when it is alone, is given up to its play, it thinks in speech, in loud or low soliloquy; at a later period, it connects with its thinking an inward hearing, for when we think, we have more or less

the feeling as if we heard within the words that we think of. In the case of a person devoid of the sense of hearing who has attained to the possession of a language of words, the possibility of such an inward hearing ceases, because he never hears the human voice, but has perhaps only been sensible in his organs—through the successful imitation of the movements of another's lips and vocal organs—of the external, physical formation of words. On this account a deaf mute who has become capable of using speech, expresses himself in relation to that which passes within him when he thinks, thus: "I cannot help thinking in speech. Even when I think by myself, I am sensible of the sound which I give forth in speech, a kind of spasm connects itself with my organs of speech." The poor Laura had for the formation and communication of words no other organ but her fingers. Her thinking was accompanied with a motion of the fingers, as could be plainly seen when she was observed talking to herself. Even in lively dreams she moved her fingers, and even when this movement in her waking state was visible, there was naturally connected with her thinking of a word, the remembrance of the sensation which she had felt in her fingers in forming the same.

(To be continued.)

ADVANTAGES OF VEGETABLE FOOD TO ANIMALS.—It is indeed a fact worthy of remark, and one that seems never to have been noticed, that throughout the whole animal creation, in every country and climate of the earth, the most useful animals that eat vegetable food, work. The all-powerful elephant, and the patient, untiring camel in the torrid zone; the horse, the ox, or the donkey in the temperate; and the reindeer in the frigid zone, obtain all their muscular powers for enduring labour from nature's simplest productions—the vegetable kingdom. But all the flesh-eating animals keep the rest of animated creation in constant dread of them. They seldom eat vegetable food until some other animal has eaten it first, and made it into flesh. Great strength, fleetness of foot, usefulness, and docility, are always characteristic of vegetable flesh-eaters.

145—Definition of Style. B. S. J.—Style is defined by Dr. Blair to be “the peculiar manner in which a writer expresses his thoughts by words.”—

“For different styles with different subjects sort—
As different garbs with country, town, and court.”

146—Dead-reckoning at Sea. H.—This is a term used in navigation to express the estimation that is made of a ship's place, without having recourse to observation of the celestial bodies. It is made by observing the way she makes by the log, and the course on which she has been steered, making allowance for drift, leeway, &c.

147—Nervous System. M.—The nervous system is the seat of sensation, volition, and motion; but by what means conveyed is as yet a mystery. Much has been written about a subtle *nervous fluid*, on which the nervous phenomena of the animal are said to depend; but the hypothesis is entirely gratuitous so far as our present knowledge extends.

148—Kali and Alkali. C.—These words had originally a similar meaning. The latter term is now applied to a class of bodies having peculiar properties, whilst the term kali is mostly confined to potash, the most active of the class of alkalis. The metal potassium is sometimes called kalium, and the symbol is always written with the initial letter K.

149—To Remove Insects from Herbaria. D.—All collections of plants should be occasionally exposed to the air, which is in itself an excellent preservative against moths. Sir J. E. Smith used in his herbaria corrosive sublimate, spirits of wine, and camphor, thus:—Two drachms of corrosive sublimate to one pint of spirit, to which add a small piece of camphor. The plants should be washed occasionally with this mixture.

150—To Etch designs on Glass. C. W.—Cover the glass all over with a thin coat of bees-wax, and trace the design with an etching-needle; then spread the whole over as uniformly as possible with fluor spar (Derbyshire spar) to the depth of an eighth of an inch, and when this is done, pour sulphuric acid, diluted with three times its weight of water, upon the spar. After the acid has remained upon it three or four hours, it is to be poured off, and the glass washed with oil of turpentine; the etching will then appear, and the parts that were covered with the wax will have remained untouched.

151—Application of Nitre. P. H.—Nitre is applied to many purposes—to the manufacture of gunpowder, to that of sulphuric acid, to that of nitric acid, though nitrate of soda, or cubic nitre, has lately superseded this use of it to a considerable extent. It is also used in making flint glass, in medicine, and for many chemical and pharmaceutical preparations; for procuring, by deflagration with charcoal or cream of tartar, pure carbonate of potash. Nitre is also mixed with salt in curing butchers' meat, and is used in some countries for sprinkling, in solution, upon grain, to preserve it from insects. The least beneficial mode in which it is employed is in making fireworks.

152—Age of Trees. W.—There are various opinions respecting the full age or natural life of trees. Mr. Evelyn, and others, imagine, that from three to four hundred years form the natural life

of the oak tree. An oak tree was felled in April, 1791, in the park of Sir John Rushout, Bart., at Northwick, near Blackley, in Worcestershire, judged to be about three hundred years old. It was perfectly sound; contained 634 cubical feet of timber in the trunk, and the arms were estimated at 200 feet more. In Mr. Gilpin's work on Forest Scenery, there is an account of oak trees in the New Forest which had marks of existing before the Conquest.

153—The Leyden Phial. S. W. T.—The Leyden phial consists of a thin glass jar, coated internally and externally with tinfoil, to within a short distance of its mouth. When the inner surface is rendered positive by union with the conductor of the electrical machine, the exterior, being connected with the ground, becomes negative by induction. When the inner and outer surfaces are united by a conductor, all electrical accumulation is annihilated by a powerful spark, and the two opposite states are found to have been precisely equivalent. If the communication between the opposite surfaces of the Leyden phial be made by the hands, a painful jarring sensation is felt at the joints of the fingers, the elbows, shoulders, and chest, commonly called the electrical shock. Metallic wires, with balls at their ends, bent, or jointed, and fixed to a glass handle, are generally used to transfer the electric charge, and these instruments are called dischargers.

154—Invisible Ink. F. M.—The most curious of all kinds of sympathetic ink, is that from cobalt. It is a very singular phenomenon, that the characters or figures traced out with this ink may be made to disappear and re-appear at pleasure. This property is peculiar to ink obtained from cobalt, for all the other kinds are at first invisible, until some substance has been applied to make them appear; but when once they have appeared they remain. To prepare this ink, take zaffre, and dissolve it in nitro-muriatic acid, till the acid extracts from it the metallic part of the cobalt, which communicates to the zaffre its blue colour; then dilute the solution, which is very acrid, with common water. If you write with this liquor on paper, the characters will be invisible; but when exposed to a sufficient degree of heat, they will become green. When the paper has cooled, they will disappear. Observe, if the paper be too much heated, they will not disappear at all.

155—Use of Hard Words. H. P. T.—Hard words, our correspondent should remember, are always to be avoided when a more simple expression can be employed that conveys the same meaning. The leading charm of Goldsmith, and other favourite authors of the same school, consists in the easy and natural style of writing, which is understood by all readers. Dr. Johnson ridicules even the correct use of hard words, by putting a very simple fact in the longest and most difficult words capable of expressing it: “Perambulating a campaign, I obviated a rustic, and interrogated him respecting the altitude of the sun, and the longitude of the way; but he did not respond; I therefore, with a single protrusion of my wand, reduced his perpendicular to a horizontal form.” in plain English; “Walking in an open field, I met a peasant, and asked him what o'clock it was, and the distance to the place where I was going: he refused to answer me, I therefore knocked him down with my stick.”

156—Magnetic Power of the Earth. G. D.—Professor Faraday says: "the earth is a great magnet; its power, according to Gauss, being equal to that which would be conferred if every cubic yard of it contained six one-pound magnets; the sum of the force is therefore equal to 8,464,000,000,000,000,000,000 such magnets. The disposition of this magnetic force is not regular, nor are there any points on the surface which can properly be called poles; still the regions of polarity are in high north and south latitudes, and these are connected by lines of magnetic force (being the lines of direction) which, generally speaking, rise out of the earth in one (magnetic) hemisphere, and, passing in varied directions over the equatorial regions, into the other hemisphere, then enter into the earth to complete the known circuit of power. A free needle shows the presence and direction of these lines."

157—To bleach Prints and printed Books. F. H. M.—Simple immersion in oxygenated muriatic acid, letting the article remain in it a longer or shorter space of time, according to the strength of the liquor, will be sufficient to whiten the engraving: if it be required to whiten the paper of a bound book, as it is necessary that all the leaves should be moistened by the acid, care must be taken to open the book well, and to make the boards rest on the edge of the vessel, in such a manner that the paper alone shall be dipped in the liquid; the leaves must be separated from each other, in order that they may be equally moistened on both sides. The liquor assumes a yellow tint, and the paper becomes white in the same proportion; at the end of two or three hours, the book may be taken from the acid liquor, and plunged into pure water, with the same care and precaution as recommended in regard to the acid liquor, that the water may touch both sides of each leaf. The water must be renewed every hour, to extract the acid remaining in the paper, and to dissipate the disagreeable smell.

158—Punctuation. S. H. W.—Our correspondent should apply all his energies to obtain a correct knowledge of punctuation. It is of much greater consequence than he supposes. The mistakes which frequently occur from a due attention to the subject, may sometimes lead to serious consequences. It is stated in the *Times* of September, 1818, that "a contract made for lighting the town of Liverpool, had been rendered void by the misplacing of a comma in the advertisement, which read thus:—'The lamps at present are about 4050 in number, and have in general two spouts each, composed of not less than twenty threads of cotton.' The contractor would have proceeded to furnish each lamp with the said twenty threads; but, this being but half the usual quantity, the commissioners discovered that the difference arose from the comma following, instead of preceding, the word *each*. The parties agreed to annul the contract, and a new one is now ordered." This is one out of numberless instances that might be recorded to prove the importance of correct punctuation.

159—To Paint the Glasses for a Magic Lantern. E.—The glasses for a magic lantern are painted in oil, with carmine, lake, prussian blue, and other transparent colours; they are laid on as thinly and clearly as possible, and in their use require no other direction than such as are familiar to all persons acquainted with drawing. Should

change or motion be required, two glasses must be employed; on the front glass should be painted the correct design that is first to be exhibited, with blank spaces left upon it, for the arms, legs, or head, in which the alteration is to take place: on the back glass, which should slide in a groove, must be delineated those parts only, with outlines or dots, which may be necessary to prevent the appearance of both at the same time. For instance, if a figure be wished to appear on a column, pyramid, or tomb, either of these should be painted on the front glass, with sufficient room left for the display of the statue: this is to be depicted on the back glass, and the space on which it is to be shown, must also be darkened as directed, before it is permitted to appear. The same rules are observable in all other devices, with which experience will soon become acquainted.

160—Use of Capital Letters in Composition. E. E.—As this subject may be useful to our readers generally, we append it in detail:—The first word of every book, chapter, letter, note, or any other piece of writing, should begin with a capital letter. The names of the months and the days of the week should always begin with a capital letter. The first word after a period should begin with a capital letter. The first word after every interrogation or exclamation should begin with a capital letter—unless a number of interrogative or exclamatory sentences occur together, and are not totally independent. The various names or appellations of the Deity should begin with a capital letter. Also, all proper names—such as the names of persons, places, streets, mountains, lakes, rivers, ships, &c., and adjectives derived from them. The first word of a quotation, after a colon, or when it is in a direct form, should begin with a capital letter. Also, the first word of an example, every substantive and principal word in the titles of books, and the first word of every line in poetry. The pronoun *I*, and the interjection *O*, are always written in capitals. Any words, when remarkably emphatical, or when they are the principal subject of the composition, may begin with capitals.

161—Hints on Composition. F.—The following rules apply to the questions proposed by our correspondent, and form a sequel to the above:—1. No abbreviations are allowable in prose, and numbers (except in dates) must be expressed in words, not in figures. 2. In all cases, excepting where despatch is absolutely necessary, the character &, and others of a similar nature, must not be used, but the whole word must be written out. 3. The letters of the same syllable must always be written in the same line. When there is not room in a line for *all* the letters of a syllable, they must *all* be carried into the next line; and when a word is divided by placing one or more of the syllables in one line, and the remainder in the following line; the hyphen must always be placed at the end of the former line. 4. The title of the piece must always be in a line by itself, and should be written in larger letters than the exercise itself. 5. The exercise should be commenced not at the extreme left hand of the line, but a little towards the right. Every separate paragraph should also commence in the same way. 6. The crotchets or brackets which enclose a parenthesis should be used as sparingly as possible. Their place may often be supplied by commas.

POPULAR GEOLOGY.

CHAPTER XII.—INDEX AND GLOSSARY OF GEOLOGICAL TERMS.

[The object of this Index and Glossary is not merely to explain the technical terms used in the preceding pages, but also to aid the student in his perusal of Geological works of a more strictly scientific character. We have not thought it necessary to repeat explanations already given, where they run to any length, or are comparatively unimportant, and have therefore in such cases simply referred to the page where the term may be found properly described. The Zoological and other scientific—but not directly Geological—terms, that are also included, are those which commonly occur in Geological treatises.]

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Acephalous. A division of molluscous animals without heads, like the oyster.

Adipocire. A substance between fat and wax, formed, under certain circumstances, from the decomposition of animal matter buried in the earth.

Alabaster. A white semi-transparent variety of gypsum.

Albite. A variety of felspar.

Algæ. An order of the Cryptogamic class of plants, including sea-weeds, from which the name is derived.

Alluvium. Stones, gravel, earth, &c., washed away from certain parts and deposited in others, not constantly covered with water.

Alum-stone. Alum is the basis of pure clay. [For Alum, see p. 248.]

Ammonite. Extinct molluscous animals allied to the Nautilus, and living in a chambered shell curved like a snake's coil.

Amorphous. Bodies without regular form.

Amygdaloid. One of the trap rocks, containing agates, and almond shaped minerals.

Analcime, or Cubixite. A mineral often found in the trap rocks.

Analogue. A body (of one period) corresponding with another (of a different period).

Ancient Raised Beaches. [See p. 307.]

Anthracite. A kind of mineral charcoal, shining, and somewhat like black lead. [See p. 184.]

Anticlinal, or Saddleback Strata. Bending from a common centre toward opposite sides.

AQUEOUS ROCKS. [See p. 35.]

Arenaceous. Sandy.

Argillaceous. Clayey.

Arragonite. A mineral first found in Arragon, in Spain, and composed of carbonate of lime.

Augite. A dark green or black mineral, forming one of the constituents of certain volcanic rocks.

Artesian Wells. These are made by boring perpendicularly through various strata, and generally to a great depth. First practised at Artois, in France: hence the name.

Atolls. Ring-shaped coral islands.

Avalanches. Masses of snow formed at great heights in the Alps, and which as they break away and descend, become frequently of enormous size through fresh accumulations.

Basalt. One of the most common and interesting varieties of the trap rocks. [See p. 215].

Basin. Deposits lying in a cavity or depression in the earlier rocks, such as the Paris Basin, and the London Basin.

Belemnites. Extinct molluscous animals, having a chambered shell, straight, long, and conical.

Bitumen. Mineral pitch. [See p. 65.]

Bituminous Shale. A clayey mud strongly impregnated with bituminous matter.

Blende. A metallic ore, found in brown and shining crystals, and consisting of a compound of zinc and sulphur.

Bluffs. High precipitous banks overhanging seas, &c.

Botryoidal. Resembling in form bunches of grapes.

Boulders. Great blocks of stone, found scattered about in places to which they do not naturally belong, and which, therefore, have been transported from other parts, which are often traceable, and lying at a great distance. [See p. 303].

Breccia. Angular rock fragments connected by some mineral substance, such as lime.

Calc Sinter. Petrifying springs. A German term.

Calcaire Grossier. Certain strata of the Paris basin.

Calcareous. Containing lime.

Calcareous Rock. Limestone.

Calcareous Spar. Crystallised carbonate of lime.

Calcedony. An uncrystallised flinty mineral.

Carbon. One of the elementary bodies, which can neither be decomposed or burned.

Carbonate of Lime. Lime in combination with carbonic acid.

Carbonated Springs. Natural springs highly charged with carbonic acid gas, and of frequent occurrence in volcanic districts.

Carbonic Acid Gas. The gas obtained artificially by the slow burning of charcoal, and which often issues naturally from the earth, especially in volcanic countries.

Carboniferous. A group of the Secondary strata, otherwise known as the Coal formation. The word is also applied to any stratum containing coal.

Cataclysm. A deluge.

Cephalopoda. Molluscous animals with the organs of motion around their heads.

Cetacea. The whale family. An order of animals, vertebrated and mammiferous.

Chalk. White earthy limestone. [For *Chalk System*, see p. 273].

Chert. A flinty mineral, approximating to flint and calcedony.

Chloritic Sand. Sand of a green colour, which it derives from the presence of the mineral chlorite.

Clay Slate Formation. [See page 126.]

Clay and Gravel Ridges. [See p. 304].

Cleavage. The quality possessed by slate rock of being cloven into thin laminæ, or plates. See p. 126.

Clinkstone, or Phonolite. So called from the sonorous sound it emits when struck. One of the trap rocks.

Coal Formation. [See Carboniferous; see also p. 184].

Coleoptera. Beetles with four wings, the upper pair hardened into a shield.

Conformable. Strata lying one above the other, in the same direction, are conformable; but when they lie in different directions, as when one is inclined and the other horizontal, they are called *unconformable*.

Congeners. Species belonging to the same genus.

Conglomerate, also called *Pudding Stone*, consists of pebbles of rock-fragments set, as it were, in a cement or paste, formed by another mineral substance.

Coniferae. Plants, like the pine and fir, which have their seed in cones.

Coprolites. Petrified animal excrements.

Cornbrash. A rock that *breaks* readily under the action of the plough in the preparation of the soil for *corn*.

Corals. [See p. 97].

Cosmogony, or Cosmology. Words expressive of speculations regarding the origin of the earth. [See p. 3].

Crag. Certain tertiary deposits of sand with shells, &c., are so called in Norfolk and Suffolk.

Crag and Tail. [See p. 304].

Crater. The circular cavity, or chimney through which volcanic matter is ejected.

Cretaceous. Chalky.

Cretaceous System. One of the systems of the Secondary strata. [See p. 273].

Crop out. When strata are pushed up above the surface of the earth, they are said by miners to *crop out*.

Crust of the Earth. [See p. 4 and 33].

Crustacea. Animals of the crab and lobster class, which possess a hard shell or crust, which they renew periodically.

Cryptogamic Plants are such as mosses,

ferns, and sea-weeds, in which the organs of reproduction are concealed.

Crystals. The regular forms with facets like those of the cut glass of our chandeliers, in which simple minerals are often found, are known by this name. Such minerals are said to be crystallised. When regular crystals are broken, or when a mineral consists of a confused mass of ill-defined crystals, they are said to be crystalline. Loaf-sugar is crystalline; sugar-candy crystallized.

Cupriferous. Copper-bearing.

Curved, or Contorted Strata. [See p. 36.]

Cycadeæ. Tropical plants with a short stem, and leaves that branch out in a circular form, and are called *pinnated fronds*.

Cyperaceæ. Plants like the English sedges.

Debarcle. A great rush of water, carrying before it and spreading on its way fragments of the rocks that had previously barred its way.

Débris. Loose materials arising from the disintegration of rocks.

Degradation. The slow wearing down of a part comparatively high to a lower level. Thus hills are degraded by rains and rivers.

Delta. The land formed at the mouths of great rivers by the transport and deposit of sediment contained in the latter.

Denudation. Parts of the surface of the earth laid bare by the action of running water. [See p. 303].

Deposit. Matter settled down from water.

Detritus. The particles or fragments rubbed off from rocks.

Diluvium. The loose materials collected together by the action of a deluge or some powerful current of water. [See p. 303].

Dip. Inclined strata are said to *dip* towards some point of the compass; and the angle they make with the horizon is the angle of inclination or dip.

Diptera. The order of insects that possess but two wings.

Disintegrate. To break asunder solid substances. Rocks are disintegrated by frosts, &c.

Dislocation. Put out of place.

Disrupting. Breaking asunder.

Dolerite. A trap rock, composed of felspar and augite.

Dolomite. A crystalline limestone containing magnesia.

Dunes. Low hillocks of sand blown together by the wind on the sea shore.

Dycotyledonous. Plants having two seed-vessels, or lobes, and which form one of the grand scientific divisions of the vegetable world.

Dykes. Igneous rocks injected through a rent in the superincumbent strata. [See p. 36].

Embouchure. The mouth of a river, or the area over which it extends in entering a sea or lake.

Encrinites. [See p. 159].

Eocene. Sir C. Lyell's name for the lowest portion of the Tertiary strata.

Escarpment. The precipitous front of a high ridge of land.

Estuaries. Openings of the land from the sea, through which both rivers and tides find way.

Exuvie. In geology, this means the fossil shells and other animal remains found in the earth's crust.

Faluns. A French name for Tertiary strata with shells, resembling the Norfolk crag.

False Strata, or Interstratification. [See p. 36].

Fault. A break or dislocation of strata, leaving a crack between (generally filled up with rubbish) and with the strata on one side higher than the corresponding parts on the other. [See p. 38].

Fauna. The animals natural to a country constitute its *Fauna*, as the plants form its *Flora*.

Felspar. The white angular grains of granite. This simple mineral, [See *Simple Minerals*], next to quartz, is the chief material of rocks.

Ferruginous. Containing iron.

Fissile. Easily cleft.

Flint. [See p. 273].

Floetz Rocks. A German term for the Secondary strata, which was supposed to occur chiefly in *flat* beds.

Flora. See *Fauna*.

Fluvialite. Belonging to a river.

Formation. A group of strata referred to one common period or origin.

Fossils. The petrified remains of animals and plants. [See p. 63].

Fossils. Lowest strata containing. [See p. 127].

Fossiliferous. Containing fossils.

Fractures. [See p. 36].

- Freshets.** Land-floods through the sudden rising of rivers.
- Galena.** A metallic ore consisting of lead and sulphur.
- Ganoids.** An order of fishes covered with angular and *regularly* arranged scales, composed internally of bone and coated with a most brilliant enamel.
- Garnet.** A crystallised mineral, or precious stone, generally of a deep red colour, found in the igneous rocks.
- Gasteropods.** Testaceous animals with a foot directly attached to the body, as in the limpet.
- Gault, or Galt.** Beds of clay and marl lying between the Upper and Lower greensand. [See p. 273].
- Geodes.** Rounded stones, and which sometimes have a cavity within lined with crystals. Also, hollow nodules of iron-stone.
- Geology.** The science relating to the origin, formation, and structure of the earth. [See p. 3].
- Glacier.** Hardened masses of snow of immense size, found in Alpine regions. [See p. 304].
- Glacis.** An easy slope.
- Gneiss.** One of the stratified primary rocks. [See p. 125].
- Gramineæ.** Plants of the grass order.
- Granite.** An igneous rock, probably the earliest in formation of all rocks, and the one from which, by decomposition and other causes of change, most, if not all later rocks have been formed. [See p. 123].
- Grauwacke.** Grey rock. One of the primary or Transition strata. [See p. 126].
- Greensand.** Strata of sand, sandstone, and limestone belonging to the Cretaceous, or chalky group. [See p. 273].
- Greenstone.** A trap rock consisting of felspar and hornblende.
- Greywacké, or Grauwacke.** Some of the oldest fossil-bearing strata are thus called from their grey colour. The name comes from the German miners.
- Grit.** Coarse grained hard sandstone.
- Gymnospermous.** Plants with naked seeds forming one of the five great botanical divisions.
- Gypsum, or sulphate of lime.** A mineral compound of lime and sulphuric acid.
- Gyrogonites.** Seed-vessels of fresh-water plants of the genus *Chara*.
- Heterocercal.** A word applied to those fishes which have, like the shark, the tail divided into two unequal parts. This is a distinguishing feature of the early fossil fishes—all, indeed, below the magnesian limestone.
- Horizontal Strata.** [See p. 36].
- Hornblende.** A simple mineral entering largely into the composition of several of the trap rocks, and which is of a dark green or black colour.
- Hornstone.** A mineral substance nearly resembling flint.
- Hydrophites.** Aquatic plants.
- Hypogene Rocks.** Rocks formed under—and not on—the surface. The igneous belong to the first-class, the sedimentary to the second.
- Icebergs.** Great floating masses of ice, found in the polar and adjoining seas.
- Ichmites.** Fossil footsteps. [See pp. 213, 244].
- Ichtyolite.** A fish, or any portion of a fish in a fossil state.
- Ichthyosaurus.** A gigantic fossil lizard, partly allied to fish, inhabiting the seas in early geological periods.
- IGNEOUS ROCKS,** are such as granite, trap, and lava, which are supposed to have been formed by the action of heat, which reduced their constituents to a fluid or viscous substance. [See p. 35].
- Incandescent.** White-hot.
- Inclined Strata.** [See p. 36].
- Infusory Animalcules.** Microscopic creatures living in liquids, or *infusions* of various kinds.
- Inspissated.** Thickened.
- Invertebrated Animals** are such as have no backbone.
- Isothermal lines** are lines of equal heat, drawn in zones or divisions round the globe. Thus, if we begin at any one place with a certain degree of mean annual heat, we pass on, not necessarily in direct lines, but through those places that we know by experience present the same mean annual temperature.
- Joints.** The partings in rocks, such as those which divide basaltic columns into prisms, &c.
- Jura Limestone.** The mountains of Jura, between France and Switzerland, are chiefly composed of oolitic limestones: hence the name given to the group.
- Keuper.** The German name for a stratum of the Upper New Sandstone.

- Kimmeridge Clay.** A thick bed of clay, found at Kimmeridge, in the isle of Purbeck, Dorsetshire, and belonging to the Oolitic group.
- Lacustrine.** Belonging to a lake.
- Lagoons.** Creeks and pools of water, on the sea-coast.
- Lamelliferous.** Having a structure like that of thin leaves or plates.
- Lamina.** Plates. In Geology this expresses the thin layer of which an individual stratum is often composed.
- Landslip.** Land disturbed by an earthquake, or by the undermining of its base by water, and which, consequently, slips or falls down from its place.
- Lapidification.** The conversion into stone.
- Lapilli.** Small cinders from volcanos.
- Lava.** The stone thrown in a fluid state by volcanos.
- Lepidodendron.** Fossil plants of the coal measures, occupying a position between coniferous plants and lycopodiums.
- Leucite.** A white, simple, crystallised mineral, found in volcanic rocks.
- Lias.** The provincial name for a clayey limestone, and adopted by geologists for the group of the secondary strata, in which it is found. [See p. 246.]
- Lignite.** Wood converted into a sort of coal.
- LIFE ON THE GLOBE.** First appearance of [See p. 127.]—First appearance of land animals. [See p. 213.]
- Lithodomi.** Animals belonging to the mollusca, which lodge in holes in rocks, that they form by means of some chemical solvent.
- Lithogenous Polyyps.** Coral-forming animals.
- Lithographic Stone.** A limestone of slaty, and compact texture, yellowish colour, and fine grain.
- Lithoidal.** Possessing a stony structure.
- Lithological.** A word that is used to express the stony character of any mineral mass.
- Lithophagi.** Another class of molluscous animals, that eat out holes in the solid rock for their residence.
- Lithophites.** The animals that make the stone-coral.
- Littoral.** Belonging to the shore.
- Loam.** Sand and clay mixed.
- Lophiodon.** Extinct fossil quadrupeds, allied to the tapir.
- Lycopodiums.** In English they are called
- Club Mosses.** The fossil species grew to a vast size, rivalling that of modern pine-trees.
- Lydian Stone.** A flinty slate, allied to hornstone, of a greyish-black colour.
- Macigno.** An Italian term for a flinty sandstone.
- Madrepore.** Corals, mostly distinguished by their star-shaped cavities.
- Magnesian Limestone.** A group of strata, lying above the coal measures, and containing much magnesia.
- Mammifers.** Animals that suckle their young.
- Mammillary.** The breast or pap.
- Mammoth.** An extinct species of the elephant.
- Marl.** Clay and lime mingled. When hard it is called indurated marl.
- Marks on Rock Surfaces.** [See p. 304.]
- Marsupial Animals.** Quadrupeds having a bag under their belly, in which they carry their young.
- Mastodon.** Extinct animals, allied to the elephant.
- Matrix.** When a shell or simple mineral remains undetached from its native place, it is said to be in its matrix.
- Mechanical Origin, Rocks of.** These are to be distinguished from rocks of chemical origin. Sand, pebbles, &c. belong to the former. All those which possess a crystalline texture belong to the latter kind.
- Medusæ.** Shell-less, marine animals, whose organs of motion spread out or radiate like the snaky hair of the mythological Medusa.
- Megalosaurus.** A gigantic fossil animal, resembling the lizards.
- Megatherium.** An extinct fossil animal of gigantic size, resembling the sloth.
- Metalization.** [See p. 65.]
- Mesotype.** A white, needle-shaped, simple mineral, found in the trap rocks.
- Metamorphic Rocks.** These are rocks presumed to be formed by sedimentary deposits, arising from the decomposition of the igneous or primary rocks, and altered by igneous action.
- Mica.** A bright, silvery looking, simple mineral, which may be split into thin, elastic scales. It is these scales which look so brilliant in granite.
- Mica-Schist, or Mica-Slate.** One of the metamorphic rocks. [See p. 125.]

Miocene. One of Sir C. Lyell's divisions of the Tertiary strata.

Molasse. A soft, green sandstone, largely developed in Switzerland, in connexion with the Miocene Tertiary period.

Mollusca. Soft-bodied, boneless animals, such as shell-fish.

Monad. The minutest of the visible animalculæ, supposed by some naturalists to be the elementary molecules of organic beings.

Monitor. An animal of the Lizard tribe.

Monocotyledonous. Referring to plants having only a single seed-lobe, or cotyledon. On this characteristic is founded one of the great divisions of the vegetable world.

Moraine. The *Débris*, or broken-down fragments, brought into valleys by glaciers.

Mountain Limestone, or Carboniferous Limestone. This forms a series of strata, lying at the base—and forming a part of—the coal measures. [See p. 158.]

Moya. Mud poured out from volcanos.

Multilocula. Many chambered. Referring to shells, like the ammonite, &c.

Muriate of Soda. Common salt, which is composed of muriatic acid and soda.

Musaceæ. Tropical plants, allied to the plantain.

Muschelkalk, meaning shell limestone. This belongs to the Upper New Red Sandstone group, and is largely developed in Germany, whence comes the name.

Naphtha. A thin volatile fluid, and inflammable mineral, which rises from the earth in springs, and chiefly in volcanic districts.

New Red Sandstone. One of the groups of the Secondary strata. [See p. 243.]

Nodule. An irregularly shaped, but generally somewhat roundish lump.

Nucleus, or Kernel. In Geology, a solid centre, round which other matter has collected.

Nummulites. Extinct molluscous animals, of a thin, lenticular shape, commonly divided into small chambers.

Obsidian. A kind of lava, like green bottle-glass, almost black in large masses, but semi-transparent in thin pieces. Pumice-stone is a peculiar form of obsidian, and produced, it is supposed, by the expansion of steam, when water had access to the heated and melted stone.

Ochre. An earth mixed with oxide of iron,

forming together a yellow, powdery substance.

Ogygian Deluge. A traditional deluge, which is supposed to have happened in the year 1764, B.C., in the reign of Ogyges, in Atica.

Old Red Sandstone or Devonian. A group of strata, largely developed in Devonshire, and which occurs immediately below the Carboniferous group. [See p. 155.]

Oligoclase. A felspar mineral.

Olivine. A simple mineral, semi-transparent, and olive coloured, occurring in grains and crystals, in the trap rocks.

Oolite. A limestone, composed of particles shaped like the egg or roe of fish, and which gives name to one of the group of the Secondary strata. [See p. 246.]

Opalized Wood. Wood which has acquired by petrification, a structure similar to that of the simple mineral, opal.

Ophidian Reptiles. Vertebrated animals, such as the serpent.

Organic Remains. The petrified or fossil remains of plants or vegetables.

Origin of the World. [See p. 3.]

Orthocera. Extinct molluscous animals, living in a long-chambered, conical shell, like a straight horn.

Oryctology. Reasoning or discussing upon things dug up—another and inferior term for fossil remains.

Osseous Breccia. Fragments of stone found cemented together in caverns, &c.

Ossiferous Caverns. [See p. 306.]

Osteology. The part of anatomy that treats of the bones.

Out-liers. Portions of a stratum lying at some distance from the parent mass.

Ovate. Egg-shaped.

Ovipositing. Egg-laying.

Overlying Strata. [See p. 36.]

Oxide. Oxygen in combination with some metal, the name of which is, of course, usually added.

Oxygen. A constituent part of the atmosphere, and the one that is essentially the vital part.

Pachydermata. Quadrupeds with thick skins, such as the elephant, horse, &c.

Palæotherium. An extinct fossil quadruped, resembling a gigantic pig.

Paleontology. The science relating to fossil remains.

Pelagian. Relating to the deep sea.

Peperino. A volcanic rock, formed by the

- cementing together of cinders, sand, or scoræ.
- Peroxide of Iron.* When oxide of iron, or rust, has absorbed as much oxygen as it is capable of, the product is peroxide of iron.
- Petrification.* The changing into stone. [See p. 65.]
- Petroleum.* A liquid mineral pitch, which oozes, like oil, from out of the rocks where it is found.
- Phlegæan Fields, or The Burnt Fields.* The name given by the Greeks to the country round Naples, on account of the igneous action everywhere traceable.
- Pisolite.* A stone, which looks in structure like an agglutination of peas.
- Pit Coal.* The common coal we burn, which is obtained by digging in pits.
- Pitchstone.* A rock with an unctuous appearance, and uniform texture, belonging to the igneous rocks.
- Placoids.* An order of fishes, covered, irregularly, with plates of enamel. It comprehends all the cartilaginous fishes, such as the shark, with the exception of the sturgeon.
- Plastic Clay.* The clay used for pottery, and which forms one of the beds of the Eocene Tertiary period. The name is applied to a group of sands and clay.
- Plesiosaurus.* An extinct fossil animal, of amphibious habits, resembling the crocodile.
- Pliocene.* Older and Newer. Sir C. Lyell's names for those two divisions of the Tertiary period, which are the most modern.
- Plutonic Action.* The action of volcanic heat, and other subterranean agencies, under pressure.
- Plutonic Rocks.* Granite, porphyry, and the other igneous rocks, which are supposed to have been solidified from a melted state.
- Polyparia.* A class of the Coral family.
- Porphyry.* One of the igneous or plutonic rocks.
- Portland Beds—Portland Limestone.* Limestone strata, of the Oolitic group, found chiefly in the isle of Portland, on the Dorset coast.
- Pozzuolana.* Volcanic ashes, similar in nature to Roman cement, and used in Italy for mortar.
- PRIMARY ROCKS.** [See p. 123.]
- Producta.* Extinct fossil—two-valved shells, found in the older Secondary rocks.
- Pterodactyl.* A flying reptile, found in the oolitic and muschelkalk.
- Puddingstone.* Same as conglomerate.
- Pulverize.* To reduce to powder.
- Pumice.* See obsidian.
- Purbeck Limestone and Purbeck Beds.* Limestone strata, of the Wealden group.
- Pyrites. (Iron).* A compound of sulphur and iron, occurring in rocks of almost all kinds and periods. Its appearance is that of yellow shining crystals like brass.
- Pyrometer.* An instrument for the measurement of heat.
- Quadramana.* Fourhanded. The order of animals to which apes belong.
- Qua-qua-versal Dip.* The inclination or dip of beds from a centre to all parts of the compass.
- Quartz.* A simple mineral, consisting of pure silice.
- Rain-drops of remote eras.* [See p. 245.]
- Red Marl.* A name for the New Red Sandstone.
- Rock, and Rock Classification.* [See p. 35.]
- Rock Salt.* Common Salt, found in vast beds, in different formations, as in the New Red Sandstone of Cheshire.
- Rubble.* The fragments of stone, broken off or worn away from a mass, are called thus by the quarry men.
- Ruminantia.* Animals such as the ox and deer, which chew the cud.
- Saccharoid.* Stone, with a texture resembling that of loaf-sugar.
- Salt.* [See p. 243.]
- Salt Springs.* Springs of water, impregnated with common salt.
- Sandstone.* Any stone composed of grains of sand, whether the latter be of limy, flinty, or other mineral character.
- Saurians.* Animals of the lizard tribe.
- Saxicavous.* Hollowing out stone.
- Schist.* Generally meaning slate. But there is a difference between a schistose and slaty structure. Gneiss, Mica schist, and other of the primary rocks, cannot be split into an indefinite number of parallel plates, or leaves, like true slates.
- Scoræ.* Volcanic Cinders.
- Seams.* Thin layers, separating strata of greater magnitude.
- SECONDARY STRATA.** [See p. 155.]
- Secretion.* Animals and vegetables are able to secrete, that is, separate, or draw out

from the substances that nourish them, peculiar products. Bile is a human secretion; coral, a secretion of certain animalculæ; gum, a vegetable secretion.

Secular Refrigeration. The periodical cooling and consolidation of the globe.

Sedimentary Rocks. Those formed from the deposit of their materials, as sediments from water.

Selenite. Gypsum, or sulphate of lime, a simple, crystallised mineral.

Septaria. Stone balls, of a flat shape, consisting generally of iron stone, which, when broken, are found to be separated in the interior into irregular masses.

Serpentine. A rock presenting the aspect of a serpent's skin, and usually containing much magnesia.

Shale. Hardened slaty clay.

Shell Marl. Clay, peat, and other substances mixed with shells, deposited at the bottom of lakes.

Shingle. The loose, water-worn gravel and stones, on the sea shore.

Silex, or Silica. One of the pure earths. Flint is wholly composed of this.

Silicate. A chemical compound of silica, with some other substance, such as iron, making silicate of iron.

Silt. Finely comminuted, (or divided) sand, clay, and earth, transported by running waters.

Silurian Formation. A group of calcareous and clayey beds, occurring between the Grauwacke and Old Red Sandstone. [See p. 126.]

Simple Minerals. These words, which occur frequently in our glossary, are used to distinguish individual mineral bodies from rocks, which are composed usually of an aggregate of the same bodies. They are not simple, that is to say, uncompounded, in the chemical sense, for they can be analysed into various substances.

Sinter. A rock dropped or precipitated from mineral waters.

Slate. See *Schist*, also *Cleavage*.

Slip. A lesser "fault." [See p. 36.]

Solfaterra. A volcanic rent, emitting various gases and vapours, sulphurous acid, &c.

Sporules. The seed or reproductory corpuscles (minute bodies) of cryptogamic plants.

Stalactite and Stalagmite. Stalactites are long rods of stone, like icicles, hanging

from a roof, and are produced by the deposit of the lime, contained in the dropping water. Stalagmite is the crust formed on the floor, by the dropping of the same kind of water, the lime being there deposited, and the water passing away by evaporation.

Steppes. Vast plains in Northern Asia analogous to the prairies of North America, and the pampas of South America.

Stilbite. A simple mineral, crystallised, usually white, and found in the trap rocks.

Strata. Stratified, Stratification. A stratum means matter strewed out, by the motion of water or of wind. Geology shows us that a vast number of individual strata have been thus formed one above another, at very different periods, and under very different circumstances; from the study of these, results all we know of the science. [See p. 33.]

STRATA, BRITISH, TABULAR VIEW OF, p. 67.

Strike. The line of bearing, or direction of strata, which is at right angles to their prevailing dip.

Stufas. Jets of steam, often above the boiling point, issuing from clefts in the ground of volcanic districts.

Sub-Appennines. Low hills, lying at the base of the hills, usually known as the Appennines. The word is also used in connexion with a series of strata of the Older Miocene period.

Sub-Crystalline. Imperfectly crystallised.

Sulphur, or Brimstone. A yellow mineral, found chiefly in volcanic districts.

Syenite. A sort of granite, brought from Syene, in Egypt.

Synclinal. Bending or inclining towards a common centre, as the sides of a basin towards the bottom.

Talus. Pieces of rock, broken off from the steep face of the parent mass, and heaped together at the foot, in a sloping form.

Tarsi. Insects' feet, articulated, and formed of not more than five joints.

TERTIARY STRATA. [See p. 276.]

Testacea. Molluscos animals, such as oysters, &c., having a shell.

Thermal. Hot.

Thermo-Electricity. Electricity developed by heat.

Thin-Out. If a stratum grows thinner in any direction, so that at last the two

surfaces meet, and disappear in each other, it is said to thin-out.

Trachyte. One of the trap rocks. It is a variety of lava, consisting chiefly of glassy felspar, and sometimes containing hornblende and augite. In structure it is like porphyry, through the presence of detached crystals of felspar.

Theroid Animals. From *therion*, wild beast. Applied with a prefix to extinct fossil animals, whose habits are not yet satisfactorily discovered, as the *Megatherium*, *great* wild beast, and so on.

Trap Rocks. These are of volcanic origin, and consist mainly of felspar, augite, and hornblende, which mingling in various forms and proportions, give basalt, greenstone, amygdaloid, dolorite, &c. [See p. 158.]

Travertin. A white, hard, concretionary, and semi-crystalline limestone, deposited from springs.

Tripoli. A powder, composed of the flinty coverings of Infusoria, imported from Tripoli, and used for polishing stones and metals.

Tropical Climate in England. [See p. 187].

Tufa, Calcareous. A rock of a porous nature, deposited from water containing lime, on its exposure to the air. Remains of plants, and other organic substances encrusted with lime, are usually found in tufa.

Turbinated. Spiral, or screw-shaped shells.

Tufa, Volcanic. A volcanic, earthy rock, composed of a mingling of fragments of scorix, and other loose materials.

Turritile. Extinct chambered shells, allied to the Ammonites.

Unconformable Strata. [See p. 36, and also, *Conformable*.]

Unoxidised, Unoxidated. Not combined with oxygen.

Valleys of erosion are formed by the denuding power of water; flat valleys by

the silting or earthing up of chains of lakes; valleys of depression, by subterranean sinkings; and there are also valleys formed by the rents and cracks resulting from earthquakes.

Veins, Mineral. Fissures in rocks, filled up by substances different from the rocks themselves. [See p. 36.]

Vertebrated Animals. Those having a backbone, as men, and all the higher animals. One of the great zoological divisions is founded upon this characteristic.

Vertical Strata. [See p. 37.]

Vesicle. A little cell or bladder.

Vitrification. Conversion by heat into glass.

Volcano. The thing needs no description here. The word comes from *Vulcan*, the Fire-god of Mythology.

Volcanic Bombs. Masses of melted lava, ejected from volcanos, and which as they fall, take a pear or bomb shape.

Volcanic Foci. The subterranean points or centres of volcanos, where the forces are supposed to exist in the greatest intensity.

Wacke. A soft and earthy variety of basalt.

Warp. The deposit from muddy waters, directed by artificial means upon low lands.

Wealden Clay. A group of strata belonging to the Oolitic-system. [See p. 247].

Zechstein. Mine stone. Containing copper ore.

Zeolite. A family of simple minerals, usually found in the trap rocks. This includes Analcyne, Mesotype, Stilbite, &c. When exposed to the blowpipe they boil up, as it were; hence the name (from the Greek), *to boil*, and *stone*.

Zoophytes. These include corals, sponges, and other allied aquatic animals. They are called Zoophytes, or animal-plants, because they possess some of the characteristics of the life of the first, with the forms and fixed homes in the ground of the second.

THE TUTOR'S GUIDE TO THE PROFESSIONS, &c.

THE NAVAL MAN.

I WOULD be a sailor. All the arguments used by kind and indulgent parents, all the advice offered by friends—many of whom had encountered the “perils of the vast deep”—and even threats, would not deter me from going to sea.

I do not think that it was so much the love of the naval profession that made me so obstinate, as vanity. At least, when I reflect upon my thoughts at that time, how they were always dwelling upon the smart uniform of the volunteers—they were not called cadets then—and the dirk at their side, I must acknowledge that vanity had more to do with my choice of the sea as a profession, than any real love for the navy.

Since my entrance into the navy, many years have elapsed; the regulations have been altered, the uniform has been frequently changed, volunteers have been designated “naval cadets,” and very many things are now countenanced that would not then be even dreamed of.

Let me strongly advise you not to be led away, like myself, by fancying that a smart uniform constitutes a sailor. I have learned many things by sad experience since then, and that is one of them. You are young and untutored in the ways of the world, and as you will soon be associated with many youngsters of your own age, allow me to offer you some friendly advice upon the profession you have chosen—one that I love most devotedly, and admire beyond conception. It is a noble profession, and therefore take heed, lest you disgrace it. You have many hardships to encounter, many disagreeable things to put up with, and much to test your courage, morals, self-respect, and honour.—

“Fewer and happier years than mine

On thy young brow are set;

Soon thou wilt learn Time's easiest task

Is teaching to forget.”

Every flag-officer being an admiral or commander-in-chief, and each commodore of the first class being a commander-in-chief, is allowed by the Admiralty to nominate *two* naval cadets on his appointment,

and a captain is allowed to nominate *one* naval cadet on commissioning a ship, therefore if your friends know either a flag-officer or a captain, you may possibly be nominated.

The Lords Commissioners of the Admiralty have directed that all young gentlemen who may receive nominations as naval cadets at home, shall pass their examination at the Royal Naval College at Portsmouth within two months of the date of the letter of nomination. And before any candidate can be entered as a naval cadet, he must forward a certificate signed by the professor or mathematical master of the Royal Naval College, approved by the captain superintendent, together with a medical certificate of physical efficiency.

The age for admission as a naval cadet, is from twelve to fourteen years; and you will be required to write English from dictation, and to be acquainted with the four first rules of Arithmetic, Reduction, and the Rule of Three. If you fail to pass this examination your chance of entering the navy is gone, as no candidate is allowed a second examination, and all nominations are cancelled unless the candidate obtains his certificate within the specified period of two months. The commander-in-chief at Portsmouth is authorised to enter each naval cadet as a supernumerary on board the flag-ship at that port, from the date of the candidate passing the required examination (pending an appointment from the Admiralty to a sea-going ship), granting not more than a month's leave to obtain an outfit.

It is indispensable that you possess a sound constitution, and that you are physically fit for the service, and as your friends may not be aware of the fact, it is well to acquaint you that the commander-in-chief at Portsmouth directs a naval surgeon to examine into your state of health and fitness for the service; therefore, if you stammer, are liable to fits, have disease of the heart, lungs, or respiratory apparatus, you will not be granted the necessary medical certificate. I tell you this much, to save your friends unnecessary expense in sending you to Portsmouth.

When you have passed your examination, and obtained an appointment to a ship, repair on board at once, and report yourself to the commanding officer; be sure to

salute the quarter-deck or the uppermost deck in the ship, on placing your foot upon it; taking off your cap as you would to a lady.

Among those with whom you are about to mix, there are many characters that should be strenuously avoided. You will soon discover that certain among your messmates give themselves up to the pursuit of various vices, which sap and undermine those finer feelings that ornament the noble and good officers of the service. They spend their time off duty in upholding vice and ridiculing virtue; they scoff at honour, religion, duty, and discipline; and by plunging headlong into a life of folly and debauchery, if not infamy, soon terminate their hitherto bright-looking prospects by some disgraceful act that obliges them to leave the service, or at least to acquire a disreputable name in it.

Do not forget that you have other examinations to pass, and therefore endeavour to improve the time that others waste in folly, debauchery, or idleness; pay attention to all that the naval instructor teaches you, especially navigation, nautical astronomy, and the various other branches of knowledge absolutely necessary for a sailor to be acquainted with, such as the theory of projectiles, and its application to gunnery, the use of the azimuth compass, chronometers, method of taking observations with the sextant, &c.

If the ship to which you are appointed is not allowed a naval instructor, endeavour to form a plan of study for yourself, and let no one attempt to laugh you out of its usefulness, but make it your rule to adhere to the proposed plan, and study a portion of some science relating to your profession, every day. In pursuing this plan, either with or without a naval instructor, you will find your labours rendered comparatively easy if you have a note-book with an index, to record all that falls under your notice, and therefore, I recommend you to procure *The Student's Journal*, a work published by Taylor, Walton, & Maberley; and as a private journal is of great importance, let me recommend *The Private Diary*, published by the same firm.

The best method of studying without a naval instructor, is to appropriate certain days in the week to particular work, and to divide the period of study each day into

two parts. Thus, science in the morning, and general reading in the after part of the day. By general reading, I do not mean light reading, but such works as relate generally to the profession you have chosen, and that will afford you such information as every sailor should possess.

As you will require various works to assist you in your studies, I have drawn up a list of those that are suited for a naval man; and in selecting them, have been careful to recommend you not only such as are the best, but those that are generally used and recommended by some naval instructors.

ENGLISH, and the CLASSICS.—See p. 295.

ARITHMETIC.—Hind's Arithmetic.*

GEOMETRY. — Williams's Symbolical Euclid;* or Blakelock's Simpson's Euclid; Cooley's Figures of Euclid;* Hutton's Mathematics.

ALGEBRA.—Hind's Algebra* (edition for the use of schools).

TRIGONOMETRY.—Snowball's Analytical Trigonometry* (edition for the use of schools); Kelly's Spherics.*

NAUTICAL ASTRONOMY AND NAVIGATION.—Jeans on the Stars;* Inman's Navigation and Nautical Astronomy;* Problems in Surveying and Nautical Astronomy, by Jeans;* The Nautical Almanacks;* The Hurricane Guide, by W. R. Birt;* Riddle's Navigation and Nautical Astronomy.

MECHANICS.—Grandfather Whitehead's Catechism, No. 3,* (as an elementary work); Whewell's Mechanics.*

HYDROSTATICS. — Grandfather Whitehead's Catechism, No. 6;* and Miller's Hydrostatics.*

GUNNERY.—The Science of Gunnery,* by W. Greener; Naval Gunnery, by Gen. Sir Howard Douglas.*

NAVAL JURISPRUDENCE.—The Law of Naval Courts-Martial, by W. Hickman.*

SEAMANSHIP, &c.—Darcy Lever's Seamanship; Liardet's Points of Seamanship

* Those books which have an asterisk prefixed to their names are especially recommended. If there is a naval instructor on board it is advisable to submit the list to him, and the first lieutenant will point out the works on seamanship that he more particularly approves of; but my advice to you on this point is, to have Liardet's, Wilmot's, and Biddlecombe's works.

and Discipline; * Liardet's Midshipman's Companion; * Biddlecombe's Art of Rigging, &c.; * Commander A. P. E. Wilmot's Dictionary of Signals; * Hints and Advice to the Junior Officers of H. M. Navy, by the Rev. R. M. Inskip, R. N. *

Every naval man should know something besides practical seamanship. I admire a good sailor—no one values him more than myself; but then I like to see a clever man as well as a good sailor, and therefore make yourself acquainted with the history of the naval profession, and other matters relating to the navy.

To assist you in studying these matters, I have drawn up a list of such books as you should read. The list is by no means a complete one, but to add more names would perhaps only deter you from reading, and you may always add the others as you grow older and more experienced.

NAVAL HISTORY.—Brenton's Naval History of Great Britain; Ekins's Naval Battles; James's Naval History; Shipwrecks of the British Navy; Allen's Battles of the British Navy.

BIOGRAPHY.—Southey's Life of Nelson; Marshall's Naval Biography; O'Byrne's Naval Biography.

NAVAL ARCHITECTURE.—Charnock's Marine Architecture; Knowles's Elements and Practice of Naval Architecture; Fincham's Outlines of Shipbuilding; Theory and Science of Naval Architecture, by J. Blackburn; Lord Robert Montagu's Naval Architecture, a Treatise on Shipbuilding, and the Rig of Clippers, with Suggestions for a New Method of Laying down Vessels; Elements of Naval Architecture, by Commander J. N. Strange.

CHRONOLOGY.—Ralfs's Naval Chronology; Schomberg's Naval Chronology.

WORKS OF REFERENCE.—Falconer's Marine Dictionary; * Brande's Dictionary of Science, Literature, and Art; * the "Nelson Dispatches and Letters, by Sir Harris Nicolas; * Naval and Military Technical Dictionary, by Col. Burn; Mile's Epitome of the Royal Naval Service of England." *

Let me also strongly advise you to study foreign languages, especially French and Italian. The former will enable you to read the works of Bonguer (*Traité du Navire*), and Euler's (*Théorie de la Construction et de la Manœuvre des Vaisseaux*); besides

affording you the means of learning many important hints in the naval administration of other nations, by intercourse with their officers; and the latter will materially aid you in the intercommunication I have mentioned.

When abroad you will have frequent opportunities of acquiring much useful and important information respecting the countries visited—as their extent, climate, population, geology, botany, &c., and therefore let me recommend you to procure the "Manual of Scientific Enquiry," edited by Sir. J. F. W. Herschel.

Remember that discipline is the main-spring of naval machinery as much as it is of the army, and even more so. Moral conduct tends to inspire a love of discipline; the immoral ridicule discipline because it does not accord with their habits, and they call the officer who practises it a martinet, and a tyrant; but depend upon it that no ship is so comfortable as a strict one. When there is relaxation in discipline, there is always discomfort. Discipline should be rigidly practised and maintained with inflexible regularity. When this is the case, duty is carried on properly; when the officers are subordinate to their superiors, the same spirit animates the men, and lax officers will make a slovenly crew. The object of discipline is not to restrain the feelings and curb the spirits of a crew, it is to inspire them with bravery, firmness, and intrepidity. Learn to distinguish between true discipline and that spirit of tyranny that some delight to exercise under the name of discipline, which consists in harassing the crew with a variety of evolutions that can never be of service to them, and only tends to make them dissatisfied with their ship. Lord Nelson, speaking of discipline, said, "Where Lord St. Vincent used an axe, I used a penknife." Exercise your crew as much as you please in useful manœuvres, such as shifting topsails, reefing, shifting spars, &c., but do not practise them for the sake of having it said in the fleet that your ship is a *smart* ship. I was once in what is called a *smart* ship, and she was a very uncomfortable one; but that was not all, our smartness consisted in cheating, for when we exercised with other ships we had all sorts of dodges to gain time upon the other crews, and I remember that upon one occasion our men went aloft in the

middle watch to get ready some of their dodges for the exercise in the forenoon, and mighty sharp they thought they were, but the other crew was sharper, for they had got all their dodging-tackle ready in the first watch, and as our crew had not seen any preparations going on, they were quite certain in their own minds of success. The sequel may be easily guessed; the first watchers beat our "smart crew" on the old principle of "diamond cut diamond." Do not forget then, that a well disciplined ship is one thing, and that a smart ship is another; the former to be desired, the latter to be especially avoided. When discipline is once established, it only requires firmness to maintain it, and from the duty going on regularly, and every one knowing what is expected from them, comfort prevails; whereas in a ship without discipline, both officers and men get into a careless way of doing their duty, and the consequence is, that when they neglect it, they expose themselves to reproof, either in their own or another ship. Another evil resulting from a lax state of discipline is, that it generates growlers.

The ambition of every officer should be, first to learn the duties of his profession thoroughly, particularly those of the rank to which he belongs, and then to qualify himself for a higher grade. Think of a man commanding a ship, who does not know the duties of his rank, while his subordinates are well versed in them. Must he not feel humiliated? He should; yet we often see officers, ignorant of their profession, aiming at such commands which are almost certain to bring ridicule, if not disgrace upon them. I know that a captain is not accountable for events, but surely if he is defeated, or loses his ship through incapacity, he is guilty of a crime, in a moral, as well as professional point of view. By his ignorance he may sacrifice the lives of hundreds of his fellow-creatures. Reflection on the part of any one, will in a measure correct the pride that is associated with ignorance, for if a man is sensible that his officers do not place confidence in him, he should throw up the command as soon as possible—of course I mean only when ignorance and presumption go hand in hand. A reflective man must feel his own deficiency—indeed we all know our weak points, but frequently

have not courage to acknowledge them even to ourselves.

I must beg that you will learn to obey all commands; never dispute or attempt to argue their justness or practicability, but perform the duty assigned to you, without even a disapproving gesture; on the contrary, do it promptly, and with a respectful behaviour. You will thus gain the approbation and esteem of your superiors, and make friends that will be of use to you in your future career in the service. Beware of fawning; eye-servants are bad officers.

Never consider any part of the duty of a ship too trivial, everything has its use, and I hope that you will soon become acquainted with the detail and working of the boatswain's, gunner's, and carpenter's duties, and the manner of stationing the crew of your vessel; therefore, I expect that you will understand the principles upon which a watch-bill is constructed, and the best method of doing so.

Besides being able to manœuvre a ship, you should know how to cut out a sail, rig a mast, build a boat, stow a hold, knot, splice, and handle a musket or cutlass, as well as any man in your vessel.

Let me beg of you to pay strict attention to the working of a ship as regards the internal economy; the manning and arming of boats; gunnery, and seamanship generally.

As some ships have extravagant messes, where champagne and claret, with other luxuries, are indulged in daily, let me request that you will not follow the example of such of your companions as waste their time, money, and health, in debauchery, but seek to improve yourself in the practical part of your profession, and thus raise yourself to distinction, and perhaps command.

There is one subject that I feel some degree of awkwardness in touching upon, but as it is of great importance to your character as an officer and a gentleman, I must rather brave your anger than neglect the duty I have undertaken to perform—the subject is that of lying. Do not start, and be offended at my remarks; you may not have any intention of lying, but yet now and then indulge in what sailors call "*uarning*," or "spinning long yarns," being a kind of falsehood that landsmen term "drawing the long bow."

Yarning is indeed nothing more or less than lying in every sense of the word, because it is a deviation from truth, and when "yarners" are detected, they become the objects of universal contempt, ridicule, and suspicion. The practice is low and mean, and as a rule, you will generally find that the greatest liars are the greatest fools.

Perhaps you have heard of the story related by a gentleman who was travelling on the top of a coach with two soldiers and a sailor, who were continually quarrelling during the journey. At last he determined to find out the reason, and asked "Jack" (who had been yarning so much as to call forth some angry expressions from the soldiers) what was the matter. "Why shiver their timbers!" said Jack, "landlubbers as they are! they won't believe that at Navarino we slept three nights running, up to our very chins in blood!" Exaggeration is nothing more than another term for lying; therefore do not deceive yourself with the idea that you *only exaggerated a little*.

Mates may pass for lieutenants when abroad, under certain regulations, (*Admiralty Instructions*, art. 21, chap. ii.), but they are required to pass another examination at the Royal Naval College, within two months after their return to England, to entitle them to confirmation from the date of their first certificate; and if they fail to pass their *first* examination at the Royal Naval College, then the Admiralty will not allow their original seniority. Mates who have already passed abroad, are allowed to choose, either the first or second examination day at the college, after their arrival in England; or, if belonging to a ship under orders to be paid off, on the first or second examination-day after having being so paid off. The examination of officers at the Royal Naval College, takes place as follows:—

In Seamanship, first Wednesday in the month.

In Navigation,* second Wednesday in the month, at 9, A.M.

In Gunnery, on the fourth Monday in the previous month.

In addition to these branches, officers are examined on the principles and application of local attraction of compasses.

* Cadets are examined on the same days as officers in navigation, and at the same hour.

The introduction of steam-power into the navy of late years, has rendered the study of steam a necessary part of the education of a naval man, and those who have not acquired a knowledge of this mode of navigation, are allowed to study at the Royal Naval College until perfected in its applications; indeed no officer can be appointed to the command of a steamer, until he has been examined at the Royal Naval College, and obtained a certificate of qualification to navigate a steam-vessel.

You have now fairly entered into an honourable profession; endeavour to gain a good name for yourself, and do not forget that this is only to be accomplished by industry, obedience, promptness to obey, and moderation in commanding; attention to discipline, punctuality, bravery, religious and moral principles, and zeal for the service; fostering noble thoughts, and love of country; and by avoiding slander, duelling, gaming, drinking, falsehood, luxuriousness, pride, skulking, rashness, presumption, and all such vices.

On then, and earn the laurel wreath,
And may thine early deeds of fame
So stainless be, that envy's breath
May cast no shadow on thy name.

IMPORTANCE OF HUMILITY.—Doctor Franklin once received a very useful lesson from the excellent Dr. Cotton Mather, which he thus relates in a letter to his son:—"The last time I saw your father was in 1724. On taking my leave, he showed me a shorter way out of the house by a narrow passage, which was crossed by a beam over-head. We were still talking as I withdrew, he accompanying me behind and I turning towards him, when he said, hastily, 'Stoop, stoop!' I did not understand him till I felt my head hit against the beam. He was a man who never missed an opportunity of giving instruction; and upon this he said to me, 'You are young, and have the world before you; *learn to stoop* as you go through it, and you will miss many hard thumps.' This advice, thus beat into my head, has frequently been of use to me; and I often think of it when I see pride mortified, and misfortunes brought upon people by their carrying their heads too high."

EASTERN RAMBLES AND
REMINISCENCES.

RAMBLE THE TWENTIETH.

ALEXANDRIA—ITS FOUNDER—THE PHAROS—
ANCIENT DIVISIONS OF THE CITY—HIS-
TORICAL ASSOCIATIONS AND RECORDS—
THE CLIMATE OF LOWER EGYPT, PARTICULARLY
ALEXANDRIA—CAUSES OF PLAGUE
—POPULATION, HOUSES, TEMPERATURE,
WINDS, FOGS, DEW, RAIN, HAIL, SNOW,
ATMOSPHERE, DUST—DEPARTURE FOR
CAIRO—NILE LIFE—DISTANT VIEW OF
THE PYRAMIDS—SUNSET ON THE NILE.

"This Nile was populous with floating life
For ages ere the Argo swept the seas;
Ere Helen woke the fires of Grecian strife
Thèbes had beheld a hundred dynasties;
And when the poet, whom all grandeurs please,
Named her the Hundred-gated, and the Queen
Of earthly cities, she had reached the lees
Of her large cup of glory, and was seen
Image and type of what her perfect pride had
been."
MONCKTON MILNES.

"Along thy waters, lined by palaces,
(Rich and fantastic, as a poet's dream,)
Are mingled minarets, fretted domes, and spires
Of rarest sculpture, that appear to float
Gently away upon their liquid base."
COUNTESS OF BLESSINGTON.

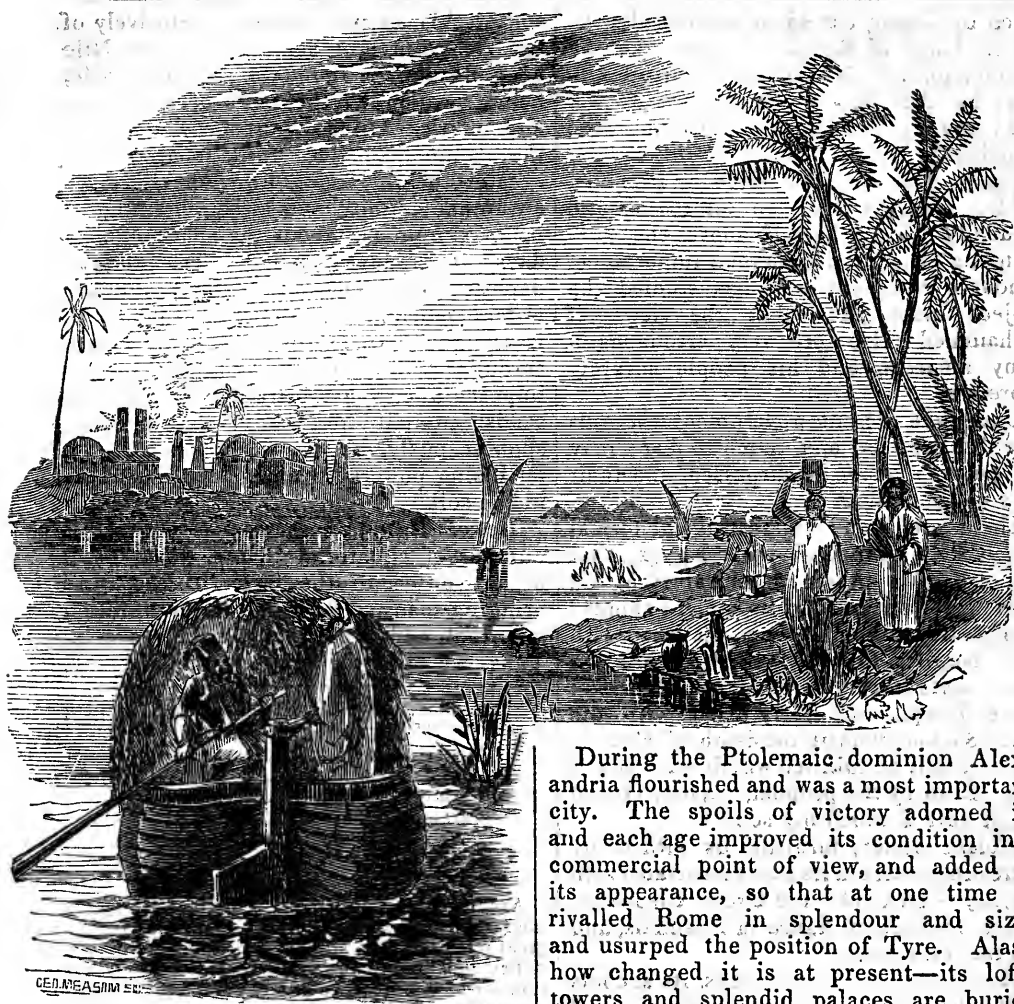
ALEXANDRIA (or, as it is now called by the natives, El Iskendereyeh), once the splendid capital of Egypt, and one of the most celebrated cities in the world, under the government of the Ptolemies, is now a squalid, miserable city, with narrow streets, unpaved, unswept, and unclean—dry and dusty in the hot season, and floating with mud in the rainy season. A gleam of sunshine is as rigidly excluded from the generality of Alexandrian streets, as a member of the swell-mob from Her Majesty's drawing-room. However, sometimes a hole in the matting stretched across the streets from roof to roof, for the purpose of excluding the rain and sunshine, admits a stray sunbeam, that revels with provoking playfulness in the gloomy place; dancing o'er the heaps of filth and garbage in the corners of the street, the richly-gilt pipe-bowls on the shelf of the tobacco merchant, and dazzling the eyes of the smokers collected around his shop. Sometimes we encounter pools of stagnant water, filled with decomposing vegetable matter and the carcases of animals.

Alexander the Great gave a Macedonian architect, named Dinocrates, an order to erect the city between the sea and Lake Mareotis, about the year B.C. 332. The greater part of the ancient city was confined within the present walls, and was divided by one main street, 30 stadia* in length, which extended from the Necropolis at the western end of the city, to its eastern extremity, and was intersected by another street ten stadia in length, which ran from Lake Mareotis in a northerly direction. By having the streets arranged in this manner, the city was exposed to the influence of the north winds, which rendered it healthy, but as the prevailing winds are southerly, the malaria from the Mareotic lake must have swept over the thickly populated city, and destroyed thousands of the inhabitants, as it has done in the present century, although I am aware that the ancients managed the internal arrangement of their cities better than their successors in the East in the present day. Where the present Pharos, or lighthouse now stands, Sostratus Chidius erected the celebrated lighthouse which is said to have been 400 feet high, and surmounted with a telescopic mirror of metal, for the purpose of enabling ships to be seen at sea when a considerable distance from the low shores of Egypt. It was erected B.C. 283, and overthrown by an earthquake about A.D. 798.

Pharos is now a peninsula, but anciently was an island connected to the mainland by a dyke called the Heptastadium, which had a passage at each end for ships to pass from one port to the other. Opposite to Pharos was a point called Lochias, which ran out into the sea, and terminated in a place called Acro-Lochais, where the Pharillon now stands.

Between Lochias, Cleopatra's Needles, and the Rosetta Gate, was the court end of the city, called Bruchion, where the theatre, various temples, the palaces of the Ptolemies, and the Museum formerly stood; about a mile to the south-west of this, was the Necropolis, (city of the dead), which was the great burial-place of Alexandria. To the north, and somewhat to the east of the

* A stadium was the principal Greek measure of length, and was equal to 606 feet, 9 inches, English.



Necropolis, was the Rhacotis, which bordered on the old harbour, or port Eunostus, (safe return), this contained the great temple of Serapis, which was destroyed by Theophilus, the Patriarch of Alexandria, A.D. 390. He set fire to the building, and utterly destroyed it. The north-east part of the city was bounded by the new or great port, and the south-west part was bounded by the old harbour, or port Eunostus; both of these remain in the present day; the latter was united by a canal with the lake, which was also connected with the town of Canopus by a canal which supplied the city with river water, kept in cisterns underground, traces of which are to be seen even in the present day.

During the Ptolemaic dominion Alexandria flourished and was a most important city. The spoils of victory adorned it, and each age improved its condition in a commercial point of view, and added to its appearance, so that at one time it rivalled Rome in splendour and size, and usurped the position of Tyre. Alas! how changed it is at present—its lofty towers and splendid palaces are buried beneath the sand, built into rude walls, or heaped in confused masses as rubbish.

"Thou mighty city, in fine linen clothed,
Purple, and scarlet; deck'd with gold, and pearls,
And precious stones."

thou art fallen even with the dust!

When Alexander ordered this city to be built he intended that it should be worthy of his great name, and surpass others in its splendour and riches. The walls, which were sixteen miles in circuit, were finished in seventeen days, a sufficient proof of the power of a monarch in those times, and the ability of the people, for these walls were flanked with lofty towers, and were composed of solid masonry.

From the time it was founded until

taken by Cæsar, B.C. 46, it was held by the Greek kings of Egypt. It was taken by Diocletian, A.D. 296; by the Persians, A.D. 615; by the Saracens under Omar, A.D. 640; and by the French, 1798, who were expelled by the English in 1801. Under the sway of Mohammed Allee—an iron one, 'tis true—Egypt has been improving and gradually raising herself above the surrounding cities in commercial importance, although every one who has studied the subject must allow that the views of Mohammed Allee were very erroneous in many respects, and his people severely oppressed.

Under the present government there is much to hope for, and much to fear; may the people's hopes be surpassed, and their fears be groundless.

There are many interesting historical associations connected with Egypt, that cannot fail to present themselves as we wander o'er its land and its ancient shores;—where Jacob and Joseph sojourned with their families for 400 years; where the chief events in the life of Moses occurred; where Joseph and Mary dwelt with the infant Saviour "until the death of Herod: that it might be fulfilled which was spoken of the Lord by the prophet, saying, Out of Egypt have I called my son."*

Profane history furnishes us with many interesting names in its pages associated with this city—Alexander the Great, Cleopatra, Cæsar, Diocletian, figure in its annals, and also the Ptolemies.

The seat of learning for ages, its schools of theology and philosophy, physic and astronomy, were celebrated far and near, particularly the latter, which till the time of the Saracens was famous among all nations. The valuable and celebrated library which the ambition, pride, and the wealth of the Ptolemies had collected from all parts of the earth, was destroyed by the Saracens under Caliph Omar, A.D. 642, and its 800,000 volumes appropriated as fuel for the 4,000 baths of the city, during a period of six months.

Lower Egypt is nothing more than an extensive and fertile plain, well supplied with water by the numerous subdivided branches of the Nile, and by the countless canals that intersect it. The cultivated

soil of this district consists exclusively of the rich alluvium deposited by the Nile after its annual inundation.* The Nile, being swollen by the rains of Abyssinia and interior Africa, commences to rise at the summer solstice, until it attains its greatest height about, or soon after, the autumnal equinox, and after remaining at its maximum for about the space of four days, it gradually falls.† The alluvial deposit takes place during the period the waters remained stationary: this earth is brought down by the river in its course through Nubia and Upper Egypt, superimposed upon the substratum of primæval sands, annually increasing, and diffusing spontaneously, by means of filtration, its fertilising powers to a considerable depth in the soil.

Lower Egypt possesses the greatest number of equatorial plants, which must be attributed to the water of the Nile bringing many seeds from the south, which take root, and propagate themselves here. Thus, we find the olive, myrtle, lentisk,

* This was analysed by Regnault, and found to contain in 100 parts—

Water	11
Alumina	48
Carbon	9
Carbonate of Lime	18
Carbonate of Magnesia	45
Oxide of Iron	6
Silex	4

According to Professor Ehrenberg's recent microscopical examination, it appears that the great fertility of the alluvial deposit of the Nile is not so indebted to any peculiar mineral constitution, or to the presence of any great abundance of vegetable matter, as to the vast accumulation of extremely minute forms of microscopic animals, which by their decomposition enrich and fertilise the soil.

† The height to which the Nile rises varies: at Thebes it is about 36 feet; at the cataracts 40 feet; at Rosetta only 3½ feet. In 1843 it rose at Cairo to the height of 26½ feet; a good Nile being considered to be 22 feet. From time immemorial the first day of the rise of the Nile has ensued soon after the summer solstice; and at Cairo the phenomenon has usually taken place some time between the 1st and 10th of July; in 1843, however, there was a rise of the river on the night of the 5th of May, which continued four days (destroying 30,000 trees, plants, and shrubs, in the gardens of Ibrahim Pacha, at Rhodda), after which the water fell, and continued doing so until the period of the summer solstice. History does not afford an example of so early a rise of the river, and only a few instances are recorded of a second rise taking place shortly after the first; one of these was in the reign of Cleopatra, another in 1737.

carob, tamarisk, pomegranate, citron, banana, sycamore, fig, caper-plant, various kinds of mimosa, together with the cactus opuntia, or prickly pear. At Cairo, in some of the gardens, we observed the weeping willow, cypress, white and black poplar, tamarind, cassia fistula, and our common elm, which only rears its head to the height of a common shrub. The doum (*crucifera Thebaica*) and the date flourish at Memphis; and the *cyperus papyrus* (*παρυπος*), from which the Egyptians of old formed their paper, is found on the banks of the Nile. Nor must we forget the *carthamus tinctorious*, the sacred onion, the bean, oleander, blue and white lotus, and acacia Nilotica, that grace certain parts of the Nile's dark banks.

The climate of Alexandria, so extolled by the ancients for its salubrity, and particularly by Strabo and Josephus, has now become extremely unhealthy. The constant exhalations from the damp, salt soil, and the presence of sulphureted hydrogen gas in the atmosphere during the winter months, develop many diseases—particularly malignant fever, dysentery, rheumatism, catarrh, and ophthalmia. The atmosphere is literally saturated with saline moisture, which is evinced by the clothes, boots, woollen goods, &c. of the residents, and the hygrometer; moreover, the saline incrustations on the walls of the houses convince when other proofs do not.

The humidity of Lower Egypt, which is proverbial, may be justly attributed to its vicinity to the sea, and the low nature of the soil, which is frequently swampy. As we advance towards the tropics, the humidity decreases; its intensity is observed to be about the period of the Nile's overflow, and the heavy dews.

The plague was unknown in ancient Egypt during a long series of centuries, although we have good reason to believe that serious epidemics prevailed at times. However, since the sixth century of the Christian era, the practice of embalming the dead has been discontinued, chiefly on account of St. Anthony, (who died in 356), preaching against this ancient custom, the consequence of which was, the abolition of embalming, and the appearance of the plague in 543, which ravaged Egypt, spread over Europe, and devastated it for half a century. Before July, 1834, Egypt

had been exempted from plague for many years; but between 1831 and July, 1834, the plague appeared several times at the Alexandrian lazaretto; and its appearance in July, 1834, has been attributed to various causes, but chiefly to the importation of prohibited articles, disembarked from vessels that had arrived from places infected with the plague.

The causes of plague may be ascribed, I think, without doubt:—1st, to the filthy state of the villages, more especially that of the Ras-el-tin; 2nd, to the decomposition of vegetable and animal substances during the hot weather; 3rd, to the badly constructed huts, the floors of which are lower than the ground outside, no windows, the door insufficient for free ventilation, and the atmosphere *warm and moist*; 4th, to the crowding of many people in too small a space; 5th, to the use of brackish water, insufficient and bad food, and physical and moral misery; 6th, to the want of proper drainage and free ventilation in the streets, prevented by the huge projecting windows, and awnings spread across from house to house; 7th, to the evaporation from the salt marshes; and 8th, the present mode of burial, which does not allow the bodies to be properly interred, but half exposed to the heat of the sun.

The population of Alexandria before the downfall of the Ptolemies, was given by Diodorus at 300,000 free citizens, but from many causes it rapidly decreased. Before the plague of 1835, it consisted of 60,000 people, viz.:—

Arabs	20,000
Turks	6,000
Negroes and Moors	4,000
Armenians, Copts, and Jews ...	4,000
Europeans	5,000
Workmen in the arsenal	6,000
Seamen	12,000
Soldiers	3,000

In 1798, when the French invaded Egypt, it was estimated at 6,000; the present population is said to be about 35,000.

The houses are generally built of white calcareous stone, covered with plaster made of lime, chopped straw, sand, and salt earth, and have mostly flat roofs, covered with cement; some of these have the foundation-walls of stone, and the

superstructure of bricks, taken almost entirely from the ruins of the old city.

The *huts*, which are on an average eight feet square, are of the most miserable description, being composed of mud; the floors lower than the ground outside, seldom having any other hole than the door, which serves for smoke, domestic animals, and owners to pass in and out.

The temperature of Egypt is variable throughout the day; the thermometer, which was high at sunset, generally falls eight or twelve degrees during the night, so that the nights are seldom if ever oppressive. The mean temperature in the shade in Lower Egypt during the summer is from 90° to 100° . The mean temperature at Cairo in the winter is 58° 46; spring, 73° 58; summer, 85° 10; autumn, 71° 42.

The prevailing winds are the hot southerly winds, which sometimes last for three days together, and extend over a period of somewhat more or less than fifty days, commencing in April, and lasting throughout May; they are very oppressive, even to the natives. When these winds blow during the period of the plague, it is always more severe, and this is supposed to rise from their being charged with malaria, from the Mareotic district. The scorching *simoom*, and the oppressive *khamzin*, bringing with them clouds of impalpable dust and sand, and swarms of mosquitoes, fleas, &c., and the suffocating *shurkîyeh*,* are very distressing to travellers. During June, the wind generally blows from the north and north-east; and continues in July to blow from the north, varying from north-west to north-east. Towards the end of July, and part of September, it blows from the north, strong in the day, and calm at night; and towards the end of September the wind comes from the east.

Fogs sometimes occur in winter, and are so dense that it is scarcely possible to distinguish objects at a short distance. They only continue a short time.

Dew is rare in winter, but very abundant in summer in Lower Egypt during the north and west winds, and it disappears when the wind changes to south.

People in England generally believe

that it never rains in Egypt; but such is not the case. I have been drenched many times in Alexandria, and been in some smart showers in Cairo. Moreover, my recollections of El-Geezeh are associated with a severe storm of thunder, lightning, and rain. However, rain does not fall often, the average of upwards of forty years being only from twelve to sixteen days in the year. The rains commence in October, continue in November and December, and terminate in March. Sometimes rain does not fall for a week, and then it comes down pretty heavily for six or eight days.

Hail is rare in Lower Egypt, but more common in Upper Egypt; and snow is very rare in Lower Egypt. When snow fell at Alexandria in 1833, and at Rosetta and Atfeh, the old people of the country declared that they never recollected such an occurrence before.

The atmosphere generally is characterised by an excessive clearness and transparency, giving a beauty to the sun as it rises and sets that cannot fail to delight those who love to look at nature's glorious scenes, and transfer them to canvas; and the nights are most beautifully serene.

The best time to visit Egypt is the autumn, the later the better; and I would advise any one wishing to ascend the Nile to start in October.

Having settled all the preliminaries for a journey to Cairo, laid in a stock of provisions, not forgetting some ale and flat-irons, frying-pans and kettles, our party, consisting of fourteen, mounted our donkeys, and rode to the Mahmoudieh canal, which establishes the communication between Alexandria and the Nile. It is one of the wonders performed by Mohammed Alee, being completed in about six months. He gave a month's pay to 250,000 men, women, and children, who were ordered to enlarge and deepen the ancient canal, called Kalydi, without being furnished with any tools. They literally dug their graves with their hands — for more than 30,000 of them perished in the undertaking from disease and want. It is fifty miles long, ninety feet broad, and twenty feet deep, and its banks are generally crowded with dirty Arabs, children with sore eyes, half-naked women, donkeys, bales of cotton, groups of camels,

* For a description of these winds, see *Eastern Rambles*, p. 199, vol. ii.

and various kinds of merchandise, through which we had to thread our way; then, passing by a forest of masts that seemed to grow on its banks, we embarked on board our kanghia, or canal-boat, which looked something like the body of an omnibus placed on a narrow coal-barge near to the stern; and two masts, with huge lateen sails, rigged forward.

I soon stowed all the provisions and travelling apparatus below the loose planks of the deck and in the cabin, spread carpets and cushions in various parts, and speedily converted the gloomy-looking boat into a comfortable floating hotel, with the "Union Jack" at the stern.

It is well for people to exclaim, "Take things coolly," but if ever any one recommends me to adopt that plan in future, I shall forthwith request them to take a trip in a Nile-boat, abounding in fleas, B flats, cockroaches, rats, mice, and mosquitoes, with the thermometer raging from 85° to 90°, and if they can take it coolly then, they must have more philosophy than any of our party, or even Mr. Mark Tapley, of good repute.

The voyage up the canal was monotonous; no breeze to make us move quickly through its dirty waters, the men were obliged to tow us with ropes, and as we passed some Arab mud villages, we received a full salute of dog-barking, and which we generally returned with another of stones, just by way of compliment. With the exception of these little greetings, a few acacias waving on its banks, some mimic salutes from ale-bottles, and the winding of the canal (which might have been cut straight), there was nothing occurred to notice until we arrived at the locks at Atfeh, about one o'clock the following morning, a period of 14½ hours after we started. Having passed through the locks, we moored the boat to a post in the bank, and brewed a bowl of punch to celebrate our *entrée* upon the Nile's broad waters.

The Nile is first seen at Atfeh; and if a crowd of Kanghias, mud huts with swarms of pigeons, dirty Arabs, and donkeys to fill in an otherwise sombre-looking scene, without one green tree to wave a welcome with its leaves, can be called interesting, then pray imagine Atfeh to be so. For my own part, I was glad when we left it, and longed to sail on the sacred river.

Nile life is peculiar, and not without its interest and amusements; there are many objects to attract the attention of the novice in Eastern travel. In this place you see mud villages with their conical dove-cots, groves of palm-trees, and waving acacias; in that, rich bending corn and carob-trees, with limes and oranges; then you meet flocks of pelicans, and teal, ring-doves, and hoopoes, that afford sport for the morning and food for the evening. Great herds of buffaloes standing in the water with nothing but their heads above it, enjoying the luxury of a bath and their freedom from flies, are seen on your right; and huge creaking water-wheels worked by blindfolded oxen, irrigate the land on your left. The morning is spent in shooting, fishing, sketching, smoking, or sleeping, sometimes in bathing; the forenoon in cooking, the afternoon in eating; and as evening approaches, your crew amuse you with Arab songs, music, and dancing. Space does not permit me to relate more in this chapter, but my next Ramble will treat particularly of Nilotic life.

On the evening of the third day, just as we had rounded one of the high banks of the river, we descried before us the distant forms of the Pyramids, rendered more distinct by the sun's declining glory. On our left was an Arab village with its peculiar domed mud huts, and pigeon-cones, and a few palm-trees standing in bold relief against the golden sky, while its form was reflected in broad and massive shadows on the water, relieved by gleams of golden light; on our left, the dark-brown banks were surmounted by some stately palm-trees; and there were three women in the peculiar blue cotton vest of the country, one washing clothes in the river, and the other two bearing pitchers to procure water. In mid distance two kanghias, slowly wafted by the light-winged breezes, glided in the golden flood of light, relieved only by the deep shadows cast from their lateen sails and dark vessels. Immediately before us was a country boat laden with corn, which was tinged with the crimson hues of the setting sun, casting the deep shadow of its form upon the waters, which hurrying past the stern danced in merry wavelets crowned with crimson and golden hues. Over all, the sky in beauteous majesty hangs sublime, and purple masses

edged with crimson, and golden vistas such as Claude delighted to depict, float in that ethereal sea. The shadows deepen, the brilliant hues of heaven are mellowing fast—

“For Twilight hastes

To dash all other colours from the sky
But this her favourite azure. Even now
The East displays its palely beaming stars;
There is no end to all thy prodigies,
O Nature!”

KAF.

ELECTRO-METALLURGY.

THIS is the name given to that branch of science, by which, through the agency of an electric current, one metal is deposited in the form of minute crystals on the surface of another.

I am not now going to enter into a full account of this useful art, but to endeavour to describe such of the operations of it, as may furnish an amusing and instructive employment for some of the disciples of our mutual friend, Grandfather Whitehead.

Every one has seen, or at least heard of, Electro-plated articles. The process by which these are covered with a coating of gold or silver, as the case may be, is, in all its essentials, exactly similar to the one I am about to speak of.

It had long been known that if a steel knife be dipped into a solution of sulphate of copper, it is speedily encrusted by bright copper crystals, which adhere firmly to it, and, in fact, electro-plate it; but it never occurred to any one to apply this to any useful purpose till about the year 1838.

To whom the honour of this application really belongs, is a contested point, two or three individuals claiming it; and it would, therefore, be invidious for me to profess to decide what so much wiser heads have in vain attempted to determine.

I intend now only to treat of that branch of the art which relates to the copying of medals, casts, &c. And first for the requisite machinery: Provide a small common garden-pot of red porous clay, stop up the hole at the bottom with a cork, and place it in another earthenware vessel of convenient shape, and of size such as to leave round the pot about three inches space: a large basin, or a preserve jar will answer the purpose very well.

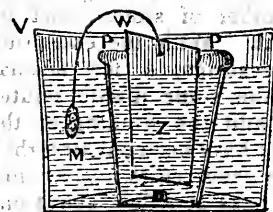
Next procure a piece of *milled* zinc, about the eighth of an inch thick, and large enough just to fit into the pot, without touching the sides or bottom; a hole is to be punched in the top of this zinc plate,



to allow a small piece of wood to be put through it, and thus it may be supported in the pot, as shown in the diagram. Half a pound of sulphate of copper, a penny-worth of vitriol, and a coil of copper wire, complete the

apparatus; let us suppose it is the object of the operator to obtain a copy of a new halfpenny piece; a mould is first to be taken in wax, which is thus accomplished—surround the medal or coin, (which must first be rubbed over with a little sweet oil), with a rim of stiff paper or card-board, and secure it with strings. Melt the wax and pour it on the medal very slowly, to prevent air-bubbles; put it away to cool, and in half an hour the mould may, by a little dexterous manipulation, be separated from the coin. This is then, by means of a camel-hair brush, to be covered with a thin coating of plumbago, or common black-lead, till a bright metallic lustre is attained over its whole front surface, and at one spot at the edge of the mould.

The arrangement of the apparatus will be better understood by the accompanying



diagram, than by the most prolix description; V V is the outer vessel, which is to be filled with a solution of sulphate of copper, which is im-

proved by the addition of a few drops of vitriol; P P is the flower-pot, which is to be filled with a mixture of twenty parts water to one of vitriol; Z is the zinc, which is to be supported in the manner above detailed; M is the wax mould, connected with Z by the copper wire W, which is stuck into the edge of the mould at the spot where I directed the application of the plumbago.

Set this away where it is not likely to be disturbed for three or four days, and at the end of that time you will have a thick coating of bright metallic copper, on all that part of the wax which was covered

with plumbago; this coating is to be gently pulled away from the mould, and a perfect copy of the original medal will thus be obtained. There only remain one or two essentials which I have not yet noticed. Before the zinc is put into the flower-pot, its surface must be *amalgamated*, which is effected by immersing it in a little weak vitriol and water, and rubbing a few globules of mercury over it with a cork. By this means the acid will not have such intense corrosive power over it, and it will, consequently, last much longer.

Every morning and evening while a medal is in progress, some of the crystals of sulphate of copper are to be tied up in a little piece of linen, and suspended so as just to touch the surface of the water—the solution will thus be always kept of the needful strength. R. C. O.

GRAMMAR IN RHYME.

FOR OUR YOUNG PUPILS.

1. THREE little words you often see,
Are Articles—*a, an, and the.*
 2. A Noun's the name of any thing,
As, *school, or garden, hoop, or swing.*
 3. Adjectives tell the kind of Noun;
As, *great, small, pretty, white, or brown.*
 4. Instead of Nouns the Pronouns stand—
Her head, his face, your arm, my hand.
 5. Verbs tell of something being done—
To read, write, count, sing, jump, or run.
 6. How things are done the Adverbs tell;
As, *slowly, quickly, ill, or well.*
 7. Conjunctions join the words together;
As, men *and* women, wind *or* weather.
 8. The Preposition stands before
A Noun; as, *in or through* a door.
 9. The Interjection shows surprise;
As, *oh!* how pretty; *ah!* how wise.
- The whole are called Nine Parts of Speech,
Which Reading, Writing, Speaking, teach.

THE FIRST PRINTED BOOK.

It is a remarkable and interesting fact, that the very first use to which the discovery of printing was applied, was the production of the Holy Bible. This was accomplished at Mentz, between the years 1450 and 1455. Gottenberg was the inventor of the art, and Faust, a goldsmith, furnished the necessary funds.

Had it been a single page, or even an entire sheet, which was then produced, there might have been less occasion to have noticed it; but there was something in the whole character of the affair which, if not unprecedented, rendered it singular in the usual current of human events.

The Bible was in two folio volumes, which have been justly praised for the strength and beauty of the paper, the exactness of the register, and the lustre of the ink. The work contained 1282 pages, and—being the first ever printed—of course involved a long period of time, and an immense amount of mental, manual, and mechanical labour; and yet, for a long time after it had been finished, and offered for sale, not a human being, save the artists themselves, knew how it had been accomplished.

Of the first printed Bible, eighteen copies are now known to be in existence, four of which are printed on vellum. Two of these are in England, one being in the Grenville collection. Of the fourteen remaining copies, ten are in England, there being a copy in the libraries of Oxford, Edinburgh, and London, and seven in the collections of different noblemen. The vellum copy has been sold as high as £281.

Thus—as if to mark the noblest purpose to which the art would ever be applied—the first book printed with moveable metal types, was the Bible.

162—The Origin of Cards. T.—About the year 1390, cards were invented, to divert Charles IV., then king of France, who was fallen into a melancholy disposition. That they were not in use before, appears highly probable.

163—Nightingale. D. J.—The nightingale may easily be distinguished from all other British songsters by the wonderfully clear and distinct manner in which he executes an endless variety of most complicated and inimitable shakes and quavers. His song indeed is quite unlike that of any other British bird, and many of his most frequently repeated notes are known to the London dealers by particular names.

164—The Bar. I. I.—The following regulations appear to be in full force in all the legal societies with reference to calling to the bar. 1. That no person can be called to the bar unless he is twenty-one years of age. 2. None who are in priest's or deacon's orders. 3. None who are on the roll of attorneys, solicitors, or proctors. 4. Persons must have kept their commons for three years before being called to the bar.

165—Origin of the word Volume. H. J.—As years passed on, writing on the inner bark of the lime-tree superseded, among the Romans, the mode of writing on leaves. The name of the bark was *liber*, in Latin; and a book formed of it was called "a *liber*." Leaves thus written on were rolled up for convenience sake, and were called a volume—a term which was afterwards applied to all books, of whatever form or shape.

166—The Military Man. H. H.—Candidates for the Royal Marines require *interest* to be placed upon the list of the First Lord of the Admiralty, and *claims* as well. The claims may be based upon having a brother, father, or some relative in the service, or one who *has* served his country, but no one is admitted without having such claims. The examinations are ordered by the Admiralty. Without any candidate knows all that is enumerated at at p. 294 of *Tutor*, he cannot pass. Trigonometry and gunnery are indispensable for a direct commission, but not for a cadetship.

167—Sadler's Wells. W. C.—The well known place of amusement, called Sadler's Wells, takes its name from a chalybeate spring, now called Islington Spa, or New Tonbridge Wells. This spring was discovered by one Sadler, 1680, in the garden of a building which he had just opened to the public as a music-house. A pamphlet was published in 1684, giving an account of this discovery, with the virtues of the water: the author says, that the well at Islington was famed before the Reformation for its extraordinary cures, and was called the Holy Well, but that it had been stopped up some years when discovered by Sadler.

168—The Bell. T. S.—The bell is composed of mixed metal, compounded of tin and pewter with copper; the proportions being 20 lbs. of pewter or 23 lbs. of tin to 1 cwt. of copper. In music it is classed as an instrument of percussion, and may be divided into three parts: the body, the clapper, and the ear by which it is hung. Its sound arises from the vibration of its parts; the stroke of the clapper changing the circumference from a round to a spherical form, which, while recovering its pristine shape, must undergo alternate changes of figure, and thus give a tremulous motion to the air, in which sound consists.

169—Inhabitants of the Moon. J.—The question proposed to us has greatly perplexed the

minds of scientific men. Sir J. Herschell observes that telescopes must yet be greatly improved, before we can expect to see signs of inhabitants, as manifested by edifices or by changes on the surface of the soil. It should, however, be observed, that, owing to the small density of the materials of the moon, and the comparatively feeble gravitation of bodies on her surface, muscular force would there go six times as far in overcoming the weight of materials as on the earth. Owing to the want of air, however, it seems impossible that any form of life analogous to those on earth can subsist there.

170—Medicine and Astrology. R. W.—It would seem that astrology was formerly considered as an essential part of the learning of a physician; for Chaucer, in the prologue to his *Canterbury Tales*, has thus characterised him:—

"With us there was a doctor of physic;
In al the worlde was ther non hym lyk,
To speke of physik and of surgerye:
For he was groundit in Astronomy.
He kept his pacient a ful gret del
In housys by his maynyk naturel:
Wel couth he fortunen the ascendent
Of his ymagys for his pacient."

171—Exchange of Geological Specimens.—We have received several letters from correspondents whose attention has been drawn to the suggestions offered on this subject by T. H., in p. 7, Appendix, vol. iii., and who express their willingness to exchange such duplicate specimens as they may possess. We accordingly publish the names of those gentlemen who have already communicated their addresses, and we shall be happy to aid this praiseworthy scheme as occasion may serve:—James B. Murdock, 162, Hope Street, Glasgow; Andrew Kerr, Murray Street, Montrose; Thomas Harrison, jun., Ightham, near Sevenoaks; John Davidson, Lower Tenements, Brechin, Forfarshire; Wm. Paling, Portland Street, Newark.

172—Coifs.—J. The use of the coif was to cover the clerical crown, because the crown of the head was originally close shaved, and only a border of hair left around the lower part, which gave it the appearance of a crown. Spelman conjectures that coifs were introduced to hide the tonsure of such renegade clerks as were still tempted to remain in the secular courts in the quality of advocates, notwithstanding their prohibition by canon. The modern coif is a badge of a sergeant-at-law, who is called Sergeant of the Coif: it is of lawn, and is worn on the head, under the cap, when they are created, and ever after. In ancient days coifs were worn by knights under their helmets.

173—Short-hand. "Having observed, (p. 11 and 18, Appendix to *Family Tutor*), your remarks on short-hand, I take the liberty of drawing your attention to a system which can be learned in a few hours, (at the longest, say a week,) with facility. I inform you that there is a society in connexion with the above, the principal aim of which is the individual improvement of its members; and in addition, there are classes, &c., formed, free to members, (conducted by letter through the post.) Persons desirous of becoming acquainted with this system, can do so by giving a small donation (from 6d.), in aid of the society, or by becoming sub-members (gratis), with the intention of becoming members. The terms for becoming members are from 2s. to 10s., and it is divided into three classes.—E. B., 8, *Villa Street, Walworth.*"

174—Cow-Tree. P. E. R.—The Cow-tree is no fable, as our correspondent imagines. Humboldt, in his *Travels*, thus describes this marvel of nature:—"On the parched side of a rock grows a tree with dry and leathery foliage, its large woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower; its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the blacks and natives are seen coming from all parts, provided with large bowls to receive the milk, which grows yellow, and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd, who is distributing the milk of his flock."

175—Colours of Leaves. S. "In p. 15, vol. ii. Appendix, I find an inquiry respecting the change of colours in leaves. The reason why all leaves have not the same shade is, because the structure of the membranes varies in the several plants, as does the degree of oxygenation, (or acidification,) which has been produced on their constituent substances; and this variety is no less remarkable than constant in different species. Cowper has sung these characteristics:—

'No tree in all the grove but has its charms,
Though each its peculiar hue; paler some,
And of a warmish grey; the Willow such,
And Poplar, that with silver lines his leaf.
And Ash, far stretching his umbrageous arm;
Of deeper green the Elm; and deeper still,
Lord of the woods, the long-surviving Oak.
Some glossy-leav'd, and shining in the sun,
The Maple, and the Beech of oily nuts.
Prolific, and the Lime at dewy eve
Diffusing odours; not unnoted pass
The Sycamore, capricious in attire,
Now green, now tawny, and ere autumn yet
Have changed the woods, in scarlet honours bright.'"

176—Cold from damp clothes. W. F.—If the clothes which cover the body are damp, the moisture which they contain has a tendency to evaporate by the heat communicated to it by the body. The heat absorbed in the evaporation of the moisture contained in clothes, must be in part supplied by the body, and will have a tendency to reduce the temperature of the body in an undue degree, and thereby to produce cold. The effect of violent labour or exercise is to cause the body to generate heat much faster than it would do in a state of rest. Hence we see why, when the clothes have been rendered wet by rain or by perspiration, the taking of cold may be avoided by keeping the body in a state of exercise or labour until the clothes can be changed, or till they dry on the person; for in this case, the heat carried off by the moisture in evaporating is amply supplied by the redundant heat generated by labour or exercise.

177—Fairies. E. L. P.—The belief in these interesting little creatures was stronger in olden times than our correspondent imagines. They are considered to be identified, in some measure, with the fabulous deities of the classic nations. In the Ashmolean collection of manuscripts at the British Museum, there is a curious recipe how to "gette a Faerie," which is worth transcribing:—"First, gett a broad square chrystall, or Venice glasse, in length and breadthe, three inches: then lay that glasse or chrystall, in the bloude of a white hen, three Wednesdayes or three Fridayes; then take it out, and wash it with holiog, and fumigate it; then take three hazel stikes, or wandes, of a year groth; pill them fair and white; and make so long as you write the spirit, or faerie's name, which you call three times, on everie stike. Then bury them under some hill, where as you suppose faeries haunt, and the Wednesdaye before you call them; and the Fridaye following, take them uppe, and call her at eight, or ten, or three, of the clock, which be good planetts and hours for that turne; but when you call, be clean in life, and turn your face towards the east, and *when you have her*, bind her to that stone, or glasse."

178—Credulity in Science. H. P.—Our young correspondent has fallen into a common error in supposing that a science must necessarily be defective because its leading principles are not easily understood. Geology is not so full of vague suppositions as he imagines. As Sir David Brewster rightly observes:—"In the infancy of a science, there is no speculation so absurd as not to merit examination. The most remote and fanciful explanations of facts have often been found the true ones; and opinions which have in one century been objects of ridicule, have in the next been admitted among the elements of our knowledge. The physical world teems with wonders, and the various forms of matter exhibit to us properties and relations far more extraordinary than the wildest fancy could have conceived. Human reason stands appalled before this magnificent display of creative power, and they who have drunk deepest of its wisdom will be the least disposed to limit the excursions of physical speculation. The influence of the imagination, as an instrument of research, has, we think, been much overlooked by those who have ventured to give laws to philosophy. This faculty is of the greatest value in physical inquiries. If we use it as a guide, and confide in its indications, it will infallibly deceive us; but if we employ it as an auxiliary, it will afford us the most invaluable aid. Its operation is like that of the light troops which are sent out to ascertain the strength and position of an enemy. When the struggle commences, their services terminate; and it is by the solid phalanx of the judgment that the battle must be fought and won."

END OF VOLUME III.

